SCHILLER

MEDICAL S.A.S.

MAGLIFE light

Service manual

Version 01.00

SCHILLER MEDICAL S.A.S
ZAE SUD
4, rue Louis Pasteur
BP 90050
F-67162 WISSEMBOURG CEDEX
Telephone : +33 (0) 3 88 63 36 00
Fax : +33 (0) 3 88 94 12 82
Internet : http://www.schiller-medical.com
E-mail : info@schiller.fr

THE ART OF DIAGNOSTICS

Part : 0-48-0084

Record of versions of the service manual

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NOTICE

This booklet is to be considered as an integral part of the device it describes.

This technical manual is intended for qualified staff, and describes the operation, maintenance and trouble-shooting of MAGLIFE light

Observation of its contents is an essential condition for correct operation of the device, as well as for the safety of the patient and the operator.

The manufacturer rejects any responsibility concerning the safety, reliability and characteristics of the device if:

- **the assembly, extensions, settings, modifications or repairs have not been carried out by it or by persons authorised by it.**
- **the electrical installation of the corresponding premises is not compliant with the provision in force in the country.**
- **the device is not used in accordance with the instructions for use.**
- **the spare parts have not come from SCHILLER.**

The booklet corresponds to the device at time of publication.

Under no circumstances does provision of this booklet represent authorisation or approval to carry out modifications or repairs on devices.

The manufacturer undertakes to provide all spare parts for a period of ten years.

Use of MAGLIFE light is described in the Instructions for Use; any use not specifically described is unforeseen and may present risks.

INFORMATION CONCERNING SAFETY

- **The product bears the mark:**

  CE- 0459

  in accordance with the requirements of Council Directive 93/42/EEC concerning medical devices, based on the essential requirements of Annex I of the latter.

- **It fully satisfies the requirements in terms of electromagnetic compatibility stipulated by standard IEC 60601-1-2 / IEC 60601-2-4 "electromagnetic compatibility of medical electrical equipment".**

- **In order to guarantee an optimal level of patient safety and electromagnetic compatibility, respect for the specific nature of the measures indicated, and correct operation of the device, we recommend that you use only spare parts from SCHILLER. Any use of accessories other than the original accessories takes places at the exclusive risk of the user. We refuse any responsibility in the event of damage arising from use of incompatible accessories or consumables.**

- **SCHILLER refuses any responsibility concerning the safety, reliability and characteristics if:**

  - **the assembly, extensions, settings, modifications or repairs have not been carried out by SCHILLER personnel or by personnel duly authorised by SCHILLER.**
  - **the device has not been used in accordance with the instructions for use.**

- **Any use of the device outside the framework of procedures described in the instructions for use takes place at the exclusive risk of the user.**

- **This booklet corresponds to the version of the device and to the technical safety standards in force at the time of publication. All rights are reserved concerning the circuits, procedures, names, software and devices referred to in this technical information booklet.**

- **The quality management system in force at SCHILLER corresponds to international standards ISO 9001 and ISO 13485.**

- **Unless written agreement has been given by SCHILLER, any reproduction of our documentation, in whole or in part, is prohibited.**

Conventions used in the booklet

Warning :	**Warns you of an imminent danger. Failure to observe this warning exposes you (and/or those around you) to mortal danger or risk of serious injury.**

Caution :	**Warning describing conditions or actions which may cause malfunction of the device or the software.**

N.B. :	**Comment or note of particular interest describing a more effective and more practical operation.** **Additional information or explanation concerning the paragraphs preceding the comment.**

Manufacturer :

SCHILLER MEDICAL
4, rue Louis Pasteur ZAE sud
F- 67 162 Wissembourg

Tel. : **33 / (0) 3.88.63.36.00
Fax : **33 / (0) 3.88.94.12.82

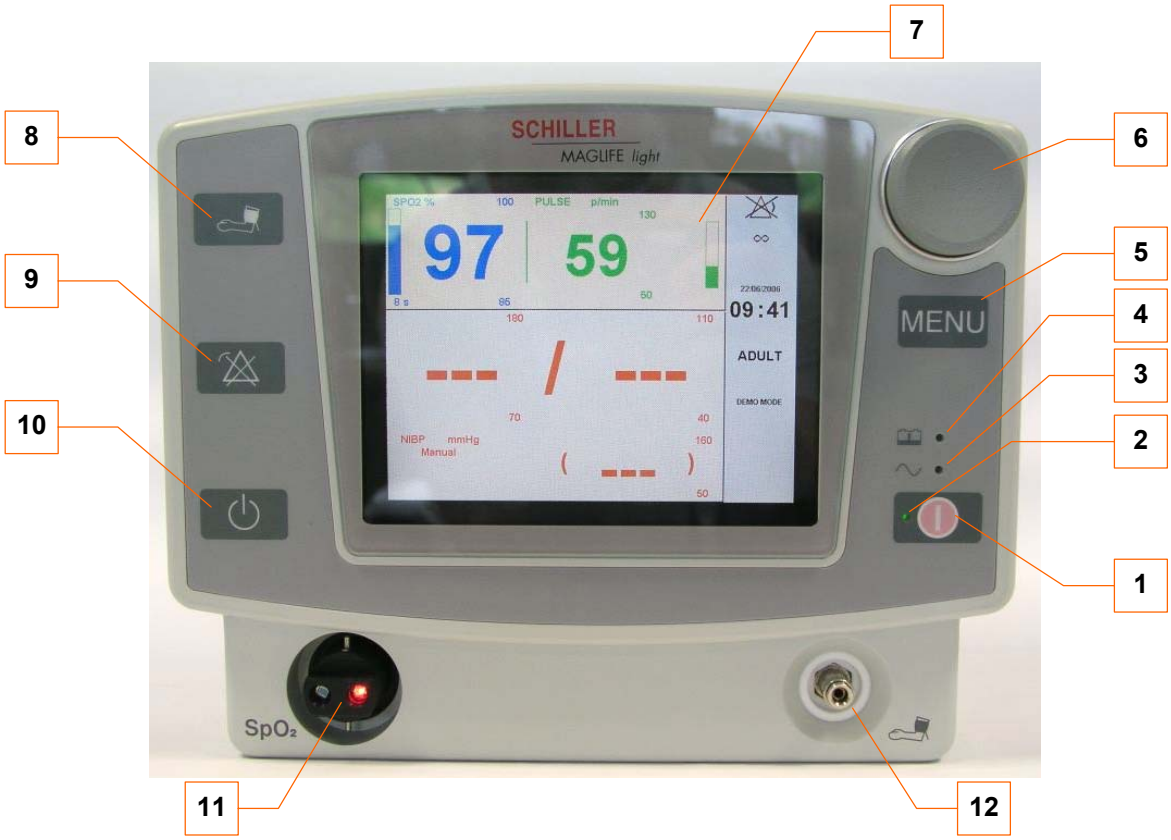
CONTENTS

1. Operation

This chapter describes concise operation of the device. For more detailed use, consult the instructions for use.

1.1 Display and command elements.

1.1.1 Front panel of the MAGLIFE light device



1 : General On/Off button for the device.

2 : Device operation light.

3 : Light indicating that the device is connected to the mains.

4 : Light indicating that the battery is charging.

5 : Button enabling either access to the main menu by display of main menu, or exit out of a menu from any area

6 : Rotating button enabling selection of menus.

7 : Screen for display of curves, parameters, menus and messages.

8 : Button enabling a blood pressure measure using a cuff to be begun or stopped.

9 : Button for switching on and off the function of (physiological and technical) audio alarm inhibition for 2 minutes or permanently.

10 : Button for partial on/off of the device, known as “Standby”.

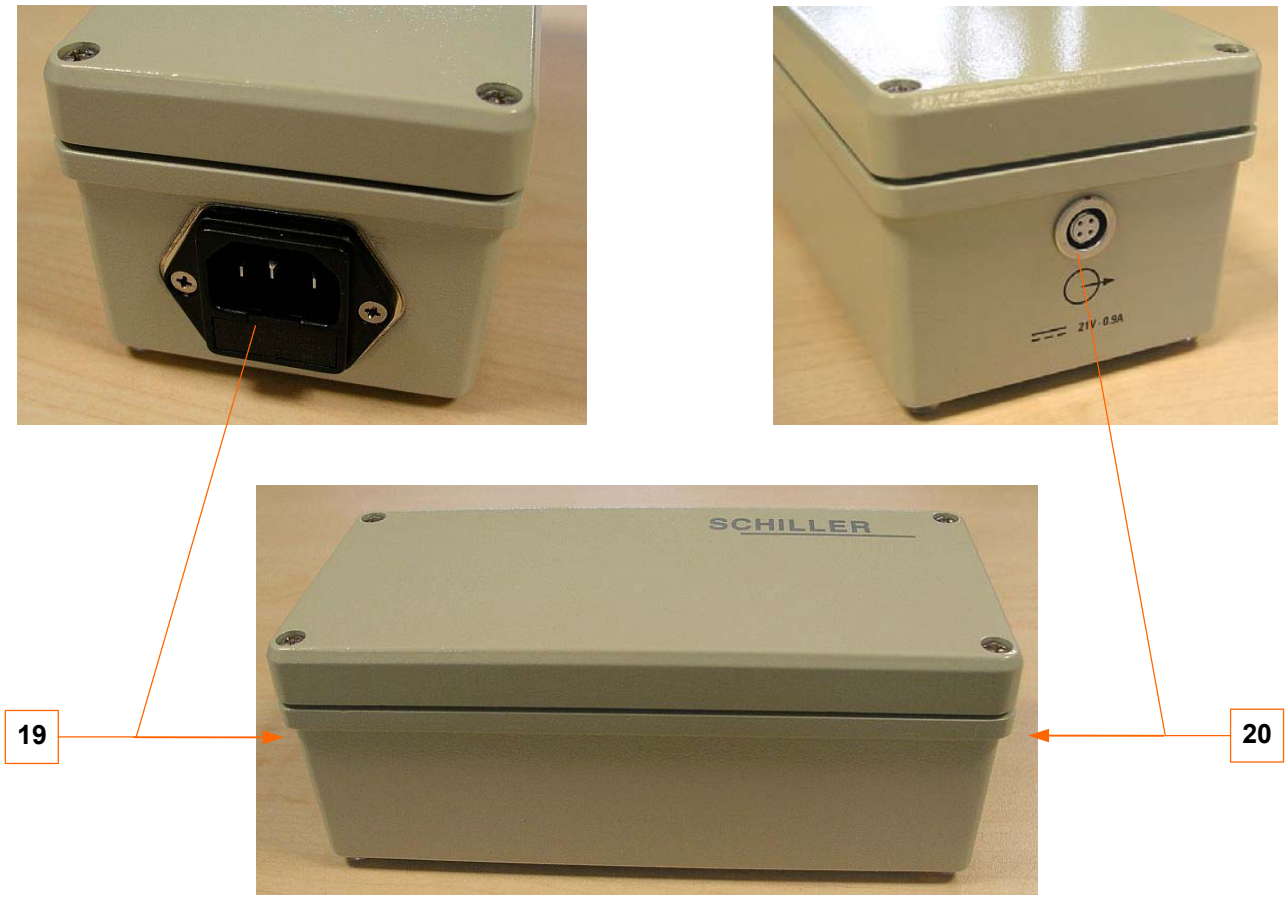
11 : Connection socket for the Oximeter fibre-optic sensor.

12 : Connection socket for the NIBP measurement cuff.

1.1.2 Rear of the MAGLIFE light device

13 : Power supply socket (low voltage cable)
14 : Speaker
15 : USB socket
16 : RS 232 socket
17 : Auxiliary sockets cover
18 : Rating plate

1.1.3 Mains power supply



19 : Mains socket

20 : Low voltage cable socket

1.2 Explanation of symbols used

1.2.1 Symbols used on the device.

Device On/Off

Mains supply present

Battery charging

Entry to main menu or exit from any menu

Reject sound of alarms

Non-invasive blood pressure

FC device protected against defibrillation shocks (device intended for direct applications on heart).

Warning! Consult the instructions for use of this device.

Identification symbol for electric and electronic devices. It is compulsory to recycle the parts of the device separately and to send the parts concerned back to the available collection and recycling centres. Inappropriate disposal can cause damage to the environment and to public health, due to the presence of harmful materials in electric and electronic devices.

CE certification body. (G-MED)

1.2.2 Symbols used on power supply.

Presence of power supply

Power supply input point

Power supply output point

1.2.3 Symbols used on the battery

	Battery can be recycled.
	Do not throw into household waste
	Do not throw onto fire
	Do not saw
	Do not break
	Rechargeable battery
	Do not short-circuit
	Unlimited storage at a temperature of 0… +40°C.

1.3 Operation.

MAGLIFE light is a monitor for surveillance of the vital parameters of a patient, exclusively intended for use during an M.R.I. (Magnetic Resonance Imaging) examination.

Depending on the version chosen, **MAGLIFE light** provides monitoring of the following parameters:
- transcutaneous oxygen pulsed arterial saturation (Oximeter).
- pulse.
- blood pressure (NIBP).

MAGLIFE light is intended to be mounted on a mobile non-magnetic base.

1.3.1 Configuration menu

The configuration menus are hidden in normal use. Access is initiated by pressing the navigation button **(6)** during start-up of the device and keeping it pressed down until the appearance of this configuration menu.

1.3.2 Power supply

MAGLIFE *light* is powered through the rear by a power supply module which is connected to the mains.
Equipped as standard with a battery, **MAGLIFE light** can follow the patient during his movements (transfer between the examination room and the adjacent preparation room, for example).

N.B. :	**For use on the 50/60 Hz - 100 V network, the EXTERNAL POWER SUPPLY module is equipped with a specific 100 V transformer.**

1.3.3 Battery charging

The battery charges itself automatically when the device is plugged in, whether off or on. During charging the light **(3)** flashes, and when the battery is fully charged it remains lit.
MAGLIFE *light* is autonomous under battery power (new condition and fully charged) for two hours (one hour in the case of intensive NIBP use).
A warning message is displayed approximately 10 to 5 minutes before automatic shut-down off the device in the event of a dead battery.

Caution :	**So as not to damage battery lifespan, never leave it in uncharged condition. In the event of device shutdown due to weak battery, the battery must be recharged as soon as possible.**

1.3.4 Switching on

Plug the mains lead into the socket **(19)**, connect the low voltage cable to sockets **(20)** and **(13)**. The light **(3)** comes on, indicating that the device is plugged in.

Caution :	**light (4) also come on: the battery charges itself automatically when the device is plugged in, even if it is not operating**.

Press button **(1)**; the related light **(2)** comes on.
After a few seconds, the screen is activated and the system initializes. The initialization sequence lasts about 10 seconds. At the end of this period, the parameters appear.

For use on battery (mains lead removed), press button **(1)** only (the battery is integrated in the device). If the battery is correctly charged, the related light **(2)** also comes on and the device starts up. When the battery is fully charged, autonomy is less than 2 hours.

N.B. :	**Operation of button (1) is inhibited during initialization.**

1.3.5 The NIBP function

When the option is present, it can be activated or deactivated in the " NIBP" menu.
To make measurements, activate the option and connect a cuff to the patient (3 possible choices: adult, child or neonatal).
Choose the function mode in the NIBP menu:

- Manual (each new measurement must be triggered with button **(8)**).
- Continuous (only the first measurement must be triggered with button **(8)**).
- At set intervals : 1; 2; 2.5; 3; 5; 10; 15; 20; 30; 60; 90 min.

The results of measurements (systolic / diastolic and mean) are displayed on the screen after each measurement.
When the SPO2 function is inactive, the NIBP module also measures and displays the cardiac frequency.

1.3.6 The SPO2 function.

When the option is present, it can be activated or deactivated in the "SPO2" menu.
To make measurements, activate the option and connect the right SPO2 sensor to the patient (3 possible choices: adult, child or neonatal).
The results (saturation level and cardiac frequency) are displayed on the screen.

1.3.7 Alarms

1.3.7.1 alarm symbols

S1		Audio alarm activated
S2		Audio alarms activated! Displayed when at least one monitoring threshold is deactivated. The technical alarms are triggered none the less.
S3		Audio alarms inhibited for 2 minutes. Displayed after button **(9)** is pressed (< 3 seconds). The remaining time is displayed under the symbol.
S4		Audio alarm permanently deactivated. Displayed when the alarm off button (**9**) is kept pressed for more than 3 seconds.

1.3.7.2 Switching off audio alarm

Button **(9)** enables the audio alarm to be switched off.

- When you press the button briefly, the audio alarm remains deactivated for 2 minutes, and the symbol **(S3)** indicates the remaining time, in minutes.
- If you press button **(9)** for 3 seconds or more, the audio alarm remains permanently deactivated until button **(9)** is pressed again. The symbol **(S4)** is displayed, the symbol "∞" flashes and a beep is emitted every 2 minutes, by way of reminder.

Caution:	**Activation / deactivation of the audio alarm.** **Permanent deactivation of the audio alarm is not authorised in certain sites of use. It is for this reason that the function can be configured.**

1.3.7.3 Physiological alarms

If the value measured exceeds a limit value, an alarm is triggered after 3 secs and

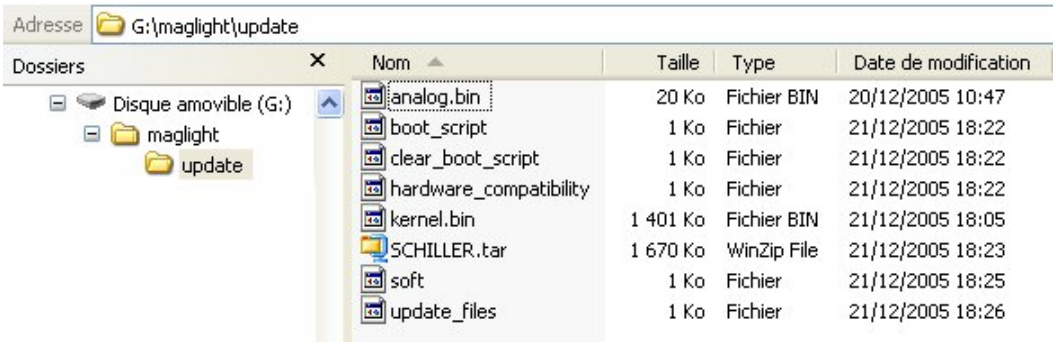
- display of the measured value flashes in red,
- an intermittent audio alarm is triggered (4 audio signals/sec),
- the exceeded parameter window flashes with a red background with reversal of the display colour
- depending on the choice made in the configuration, this audio alarm is interrupted:
  - As soon as its cause is interrupted (not locked).
  - After its cause has disappeared and button **(9)** has been pressed (locked)

1.3.7.4 Technical alarms

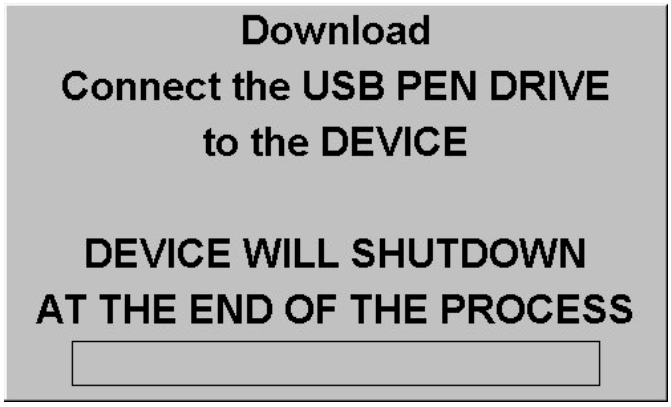
When a technical alarm is triggered:
an error message is displayed in the display field for the parameter in question ;
an intermittent audio alarm is triggered (2 audio signals), which meets its rejection configuration criteria;
a question park (**-?-**) is displayed in place of the measured value;
This alarm stops automatically on disappearance of its cause.

1.3.8 Software upgrading

It is imperative that the person who carried out this upgrade must have the skills and authority to be able to carry out the related operational and safety checks, **and this person takes full responsibility for these.**
The software upgrade is carried out using a USB key in accordance with standard 1.1 or higher. Ensure that the software loaded on the USB key in the root directory (this software only) is compatible with the device you wish to upgrade



Insert the USB key into socket **(15)** for this purpose, select the upgrade tab, and loading will begin automatically. Follow the instructions. When loading is complete, the device will shut down automatically.



1.4 Technical specifications

1.4.1 System specifications

Manufactured by	SCHILLER Medical SAS
Name of device	MAGLIFE *light*
Dimensions	
main unit	270 x 216 x 116 mm ; 10.6” x 8.5” x 4.6”
power supply	180 x 84 x 68 mm ; 7” x 3.3” x 2.7”
Weight	
main unit	6 Kg
power supply	1.3Kg
Protection class of cover	IP 21
Electric power supply	100 ; 115 ; 230 VAC 50/60Hz Voltage is factory-set
Input power	25 VA
Fuses	2x 100 mA (T) @ 230VAC ; 2x 200 mA (T) @ 100-115VAC
Batteries	12V 2 Ah Lead
Autonomy	2 hours
Ambient conditions	
Operation	
Temperature	15°C – 35°C ; 60°F - 96°F
Relative humidity	30 – 95% without condensation
Pressure	500 to 1060hPa
Magnetic field	≤ 40mT
Storage	
Temperature	-10°C – 50°C ; 13°F - 124°F
Relative humidity	30 – 95% without condensation
Pressure	500 to 1060hPa
Magnetic field	≤ 40mT
Display	TFT colour screen; 6.8” ; 98 x 132mm ; 480 x 640 pixels
Connections	SPO_2, NIBP
Interfaces	RS232, USB 1.1 for connection of equipment specified by SCHILLER
Safety standards	CEI 60601-1
CEM	CEI 60601-1-2 CISPER 11 Class B; with class A printer connected The device can be subjected to the following interferences without being affected: Static discharge up to 8kV Radio frequencies 10V/m (80 – 2500 MHz, 5 Hz modulation)
CE marking	In accordance with Directives 93/42/EEC class IIb
Protection class	Class I in accordance with CEI 60601-1

1.4.2 Technical specifications - value reader

Pulse Oximeter

OEM module	BCI
Connection	Fibre Optic
Class	CF
SPO2 accuracy	± 2 % between 70 and 99 % ± 3 % between 50 and 69 %
SPO_2 display range	0 – 99%
Pulse accuracy	5 b/min
Pulse display range	30 – 250 b/min
HF Protection	protection against electrosurgery devices

NIBP – non-invasive blood pressure

OEM Module	CAS
Connection	Fast snap
Class	CF
Measurement principle	Oscillometric
Mode	Manual, Automatic, Continuous
Types of patients	Neonatal, Children, Adults
Sensor accuracy	± 3mmHg or ± 2%
Pulse accuracy	5 b/min
Display range	
Adult/child :	systolic: 60 - 250 mmHg diastolic: 40 - 220 mmHg mean: 45 - 235 mmHg
Neonatal :	systolic: 40 - 130 mmHg diastolic: 20 - 90 mmHg mean: 35 - 105 mmHg
HF Protection	protection against electrosurgery devices

2. Testing and maintenance

This chapter describes the test and maintenance procedure recommended for **MAGLIFE light**.

2.1 Functional control

Certain functions are tested automatically by the program.
- RAM test,
- EPROM test,
- CPU test,
- ANALOG/DIGITAL converter test.

In the event of a problem, a technical alarm message is displayed on the screen.

In the event of a communication problem between the monitor's CPU and the different electronic modules, a technical alarm message ("Time out") is displayed in the window corresponding to the affected parameter.

2.2 Oximeter test

- Start up the **MAGLIFE light** device so that the Oximeter display is shown.
- Check that the **MAGLIFE light** device displays the message "sensor problem".
- Connect an SpO2 sensor to the front panel.
- Place the SPO2 sensor on your finger and check that the message changes to "pulse search", then after the curve has appeared (approximately 10 secs.) the SPO2 value for SPO2 percentage and B/min pulse should be displayed. Check that an SPO2 curve is shown and that there is a beep for each pulse.

2.3 NIBP module test

2.3.1 NIBP check

Connect an NIBP tube with an adult cuff to the front panel connection and choose adult mode.
Put on the NIBP cuff and press the NIBP button **(8).**
Check that the NIBP pump motor begins to run and that the cuff begins to inflate.
Check that the NIBP screen window begins to indicate an increase in pressure while the cuff begins to inflate.
Check that the pump stops when the screen window reads 180mmHg +/- 20mmHg..
The cuff should begin to deflate and after about 20 seconds should display the SYS/DIA/MAP values in the NIBP window.
Deactivate the SPO2 function if necessary and check the P/min display.

2.3.2 Calibration of Non-Invasive Blood Pressure

- Connect a mercury column and a test cell to the NIBP socket on the front panel of the **MAGLIFE light** device (if you do not have a test cell, an adult cuff rolled around a bottle in such a way as to have little compliance can be used instead for the purposes of the calibration).
- Activate "Calibration" in the NIBP menu; the indication on the screen corresponds to the pressure value measured by the NIBP module. Proceed with the measurement in several points, by comparison of the **MAGLIFE *light*** indication and that of the external measurement device, across the whole measurement range.

2.4 Cleaning and disinfection

Caution : **For cleaning, the device must be switched off. Remove all power sources before beginning to clean the device, in order to exclude any risk of accidental start-up of the device. Before cleaning, also unplug the sensor cables.**

No liquid must penetrate into the device; should this happen, however, the device must only be reused after after-sales service verification.

You are formally advised not to clean the devices with products such as ether, acetone, esters, aromatic products, etc.
Never use phenol-based cleaning products or products containing peroxide derivatives to disinfect the surfaces of the device case.

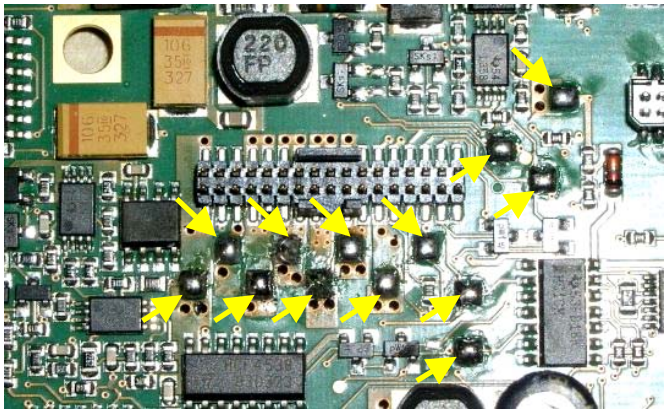
- Before cleaning the sensor electrode cables, disconnect them from the device. In order to clean and disinfect them, wipe them using a gauze cloth soaked in cleaning fluid or disinfectant. Never emerge the connectors in liquid. As a cleaning solution, you can use any cleaning or disinfectant solution used in hospital environments.
- Proceed in the same way with the device case, using a cloth lightly soaked in cleaning fluid or disinfectant. No liquid must penetrate into the device during this operation.

3. Troubleshooting

This chapter describes the tracking of breakdowns in the event of **MAGLIFE light** malfunctioning. If the tracking or correction of the fault poses a problem, contact SCHILLER After-Sales Service.

N.B. : **When there is an error message, before any intervention note the error number and restart the device to check that it is not simply the result of a crashed program.**

N.B. : **Before any intervention, check if all 13 chevrons on the CPU are short-circuited.**



ERROR	OBSERVATION	POSSIBLE CAUSES	CORRECTIVE ACTIONS
Screen is black but menus and messages are displayed		1. Microcontroller on CPU board not working.	1. Replace the microcontroller
Screen is very dark		1. Problem with backlighting connection. 2. Problem on the backlighting board	1. Check the backlighting cables. 2. Replace the backlighting board
Screen interference		1. Problem with ribbon cable connection. 2. Ribbon cable not working	1. Reposition the ribbon cable in the connector. 2. Replace the ribbon cable.
USB does not work		1. Problem in the USB cable. 2. Problem with F1000 fuse on CPU board.	1. Check the contacts in the USB cable. 2. Replace the F1000 fuse.
Rotating button does not work		1. Problem in the button cable.	1. Check the contacts in the button cable.
Speaker does not work		1. Problem with the speaker cable. 2. Problem with µcontroller buzzer on CPU board	1. Check the contacts in the HP cable 2. Replace the microcontroller
Device works on battery and shuts down shortly after starting up		1. Battery charge is low 2. Battery not working	1. Recharge for 10 hrs. 2. Replace the battery

ERROR	OBSERVATION	POSSIBLE CAUSES	CORRECTIVE ACTIONS
The device is powered with the battery, but will not start.		1. Problem with F100 fuse on CPU board. 2. Battery not working 3. CPU board not working	1. Replace the F100 fuse. 2. Replace the battery. 3. Replace the CPU board
The battery does not charge when the mains is connected	The " charge battery " LED stays off	1. Problem with F1900 fuse on CPU board. 2. Battery not working 3. CP board not working	1. Replace the F1900 fuse. 2. Replace the battery. 3. Replace the CPU board
ERROR MESSAGES			
"Time out" error (in the SPO2 window)		1. Problem on the SPO2 board	1. Replace the SPO2 board
"Time out" error (in the NIBP window)		1. Problem on the NIBP board	1. Replace the NIBP board

4. Replacement of parts

This chapter describes the dismantling of the **MAGLIFE light** device in order to replace faulty parts. The following warnings apply to any intervention inside the device.

Caution :	**Before dismantling the device, remove all power supply sources**

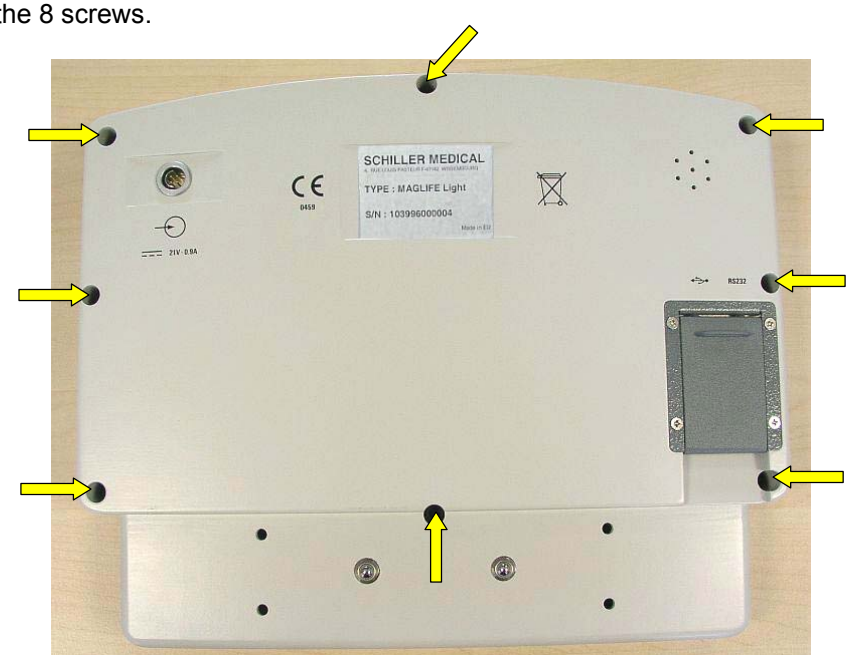
Caution :	**The device contains circuits which are sensitive to electrostatic discharge. Any MAGLIFE light intervention must be carried out with respect for ESD usage regulations. The intervention must be performed on an earthed, antistatic mat, and the operator must wear an anti-static bracelet which is also earthed.**

Caution :	**A general test of the device must be conducted after every opening of the device.**

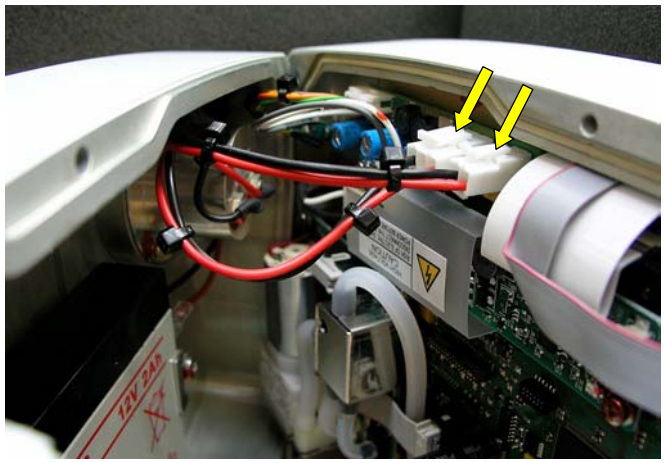
4.1 Procedure for dismantling the device

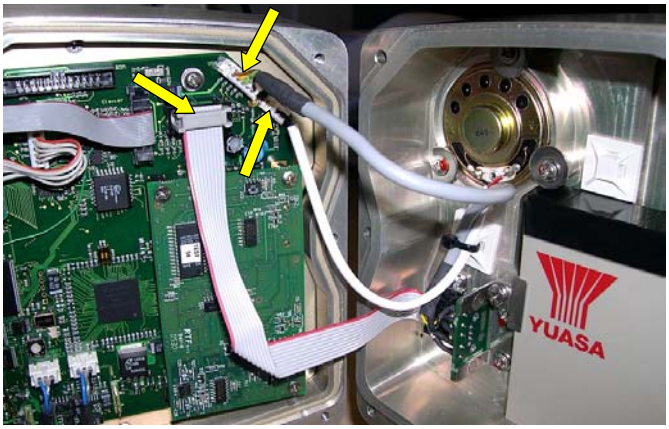
4.1.1 Opening the device

Unscrew the 8 screws.



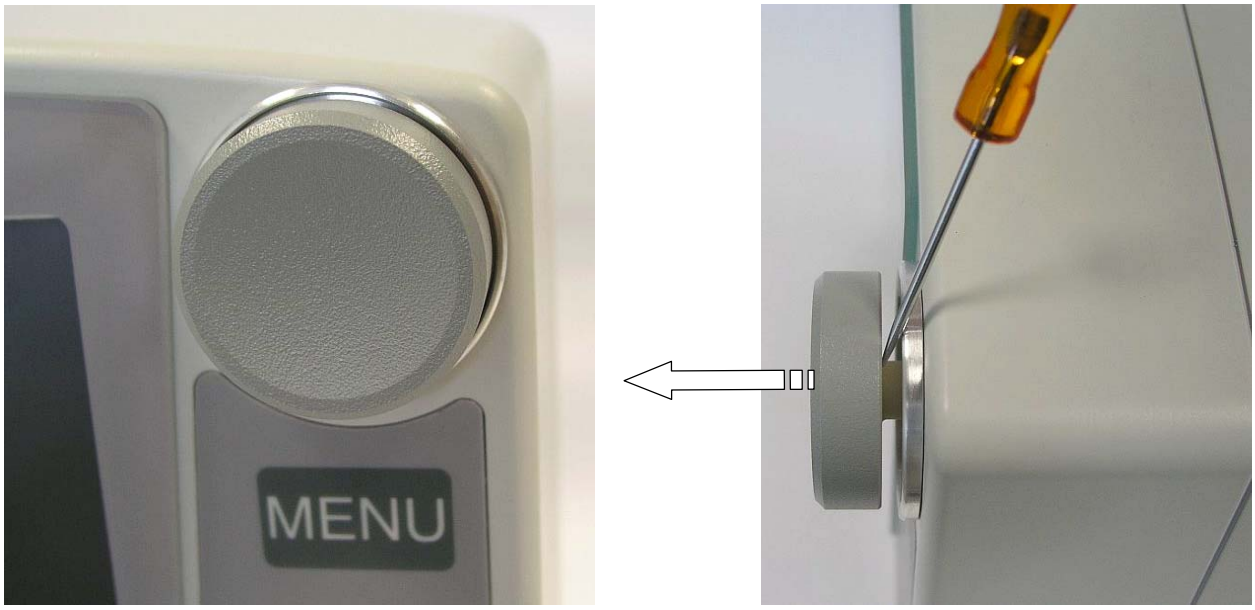
Separate the two parts of the casing and disconnect the 5 cables indicated below.



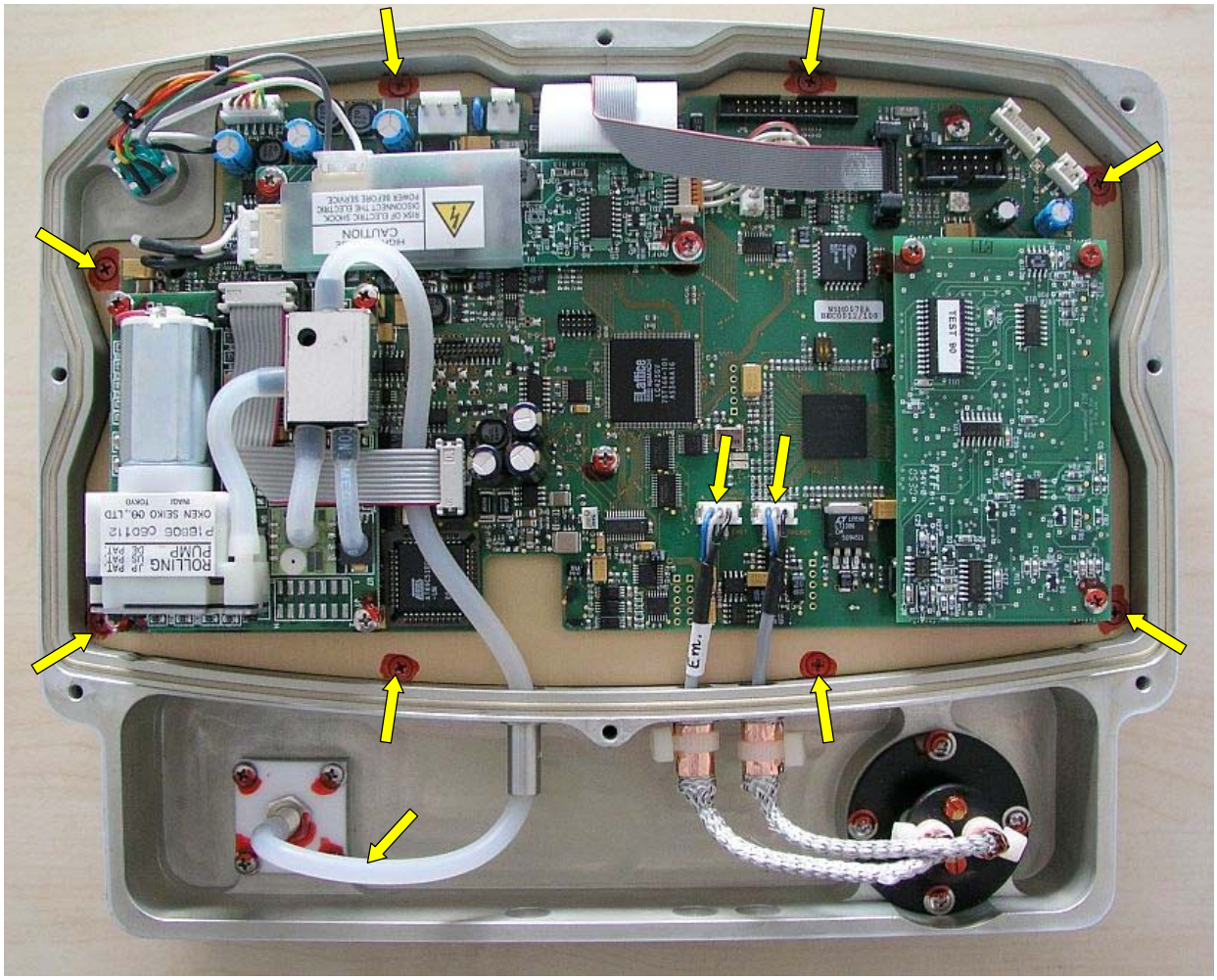


4.1.2 Removal of CPU sub-system + screen

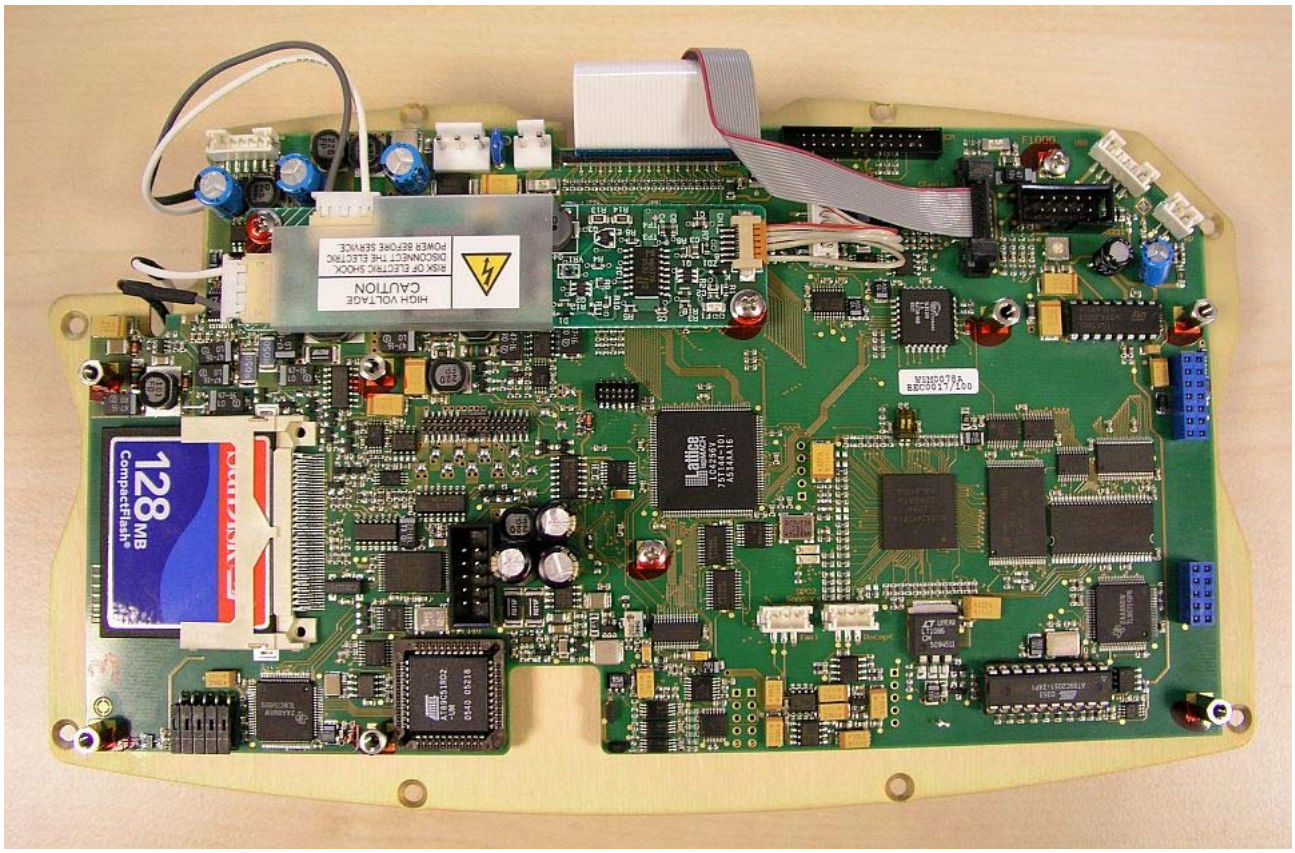
Take out the MENU button.



Disconnect the cables from the SPO2 base and the tube from the NIBP.
Unscrew the 8 screws, then extract the sub-system.



Photos of the sub-system without the SPO2 and NIBP modules:



4.2 Procedure for assembling the device

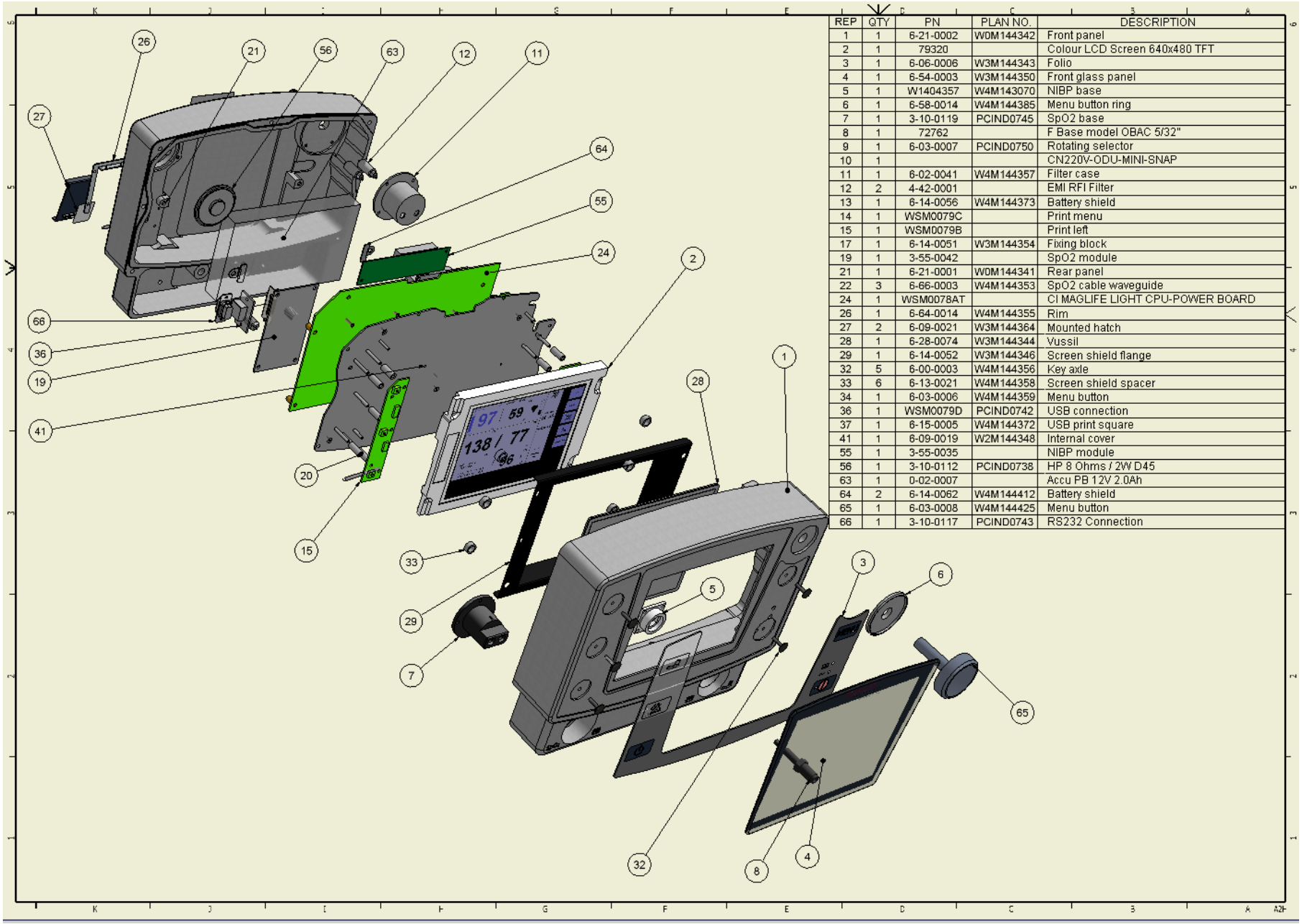
For assembly of the device, operate in reverse fashion to the dismantling procedure.

Caution :	**The cables must be positioned properly to avoid jamming them during assembly.**

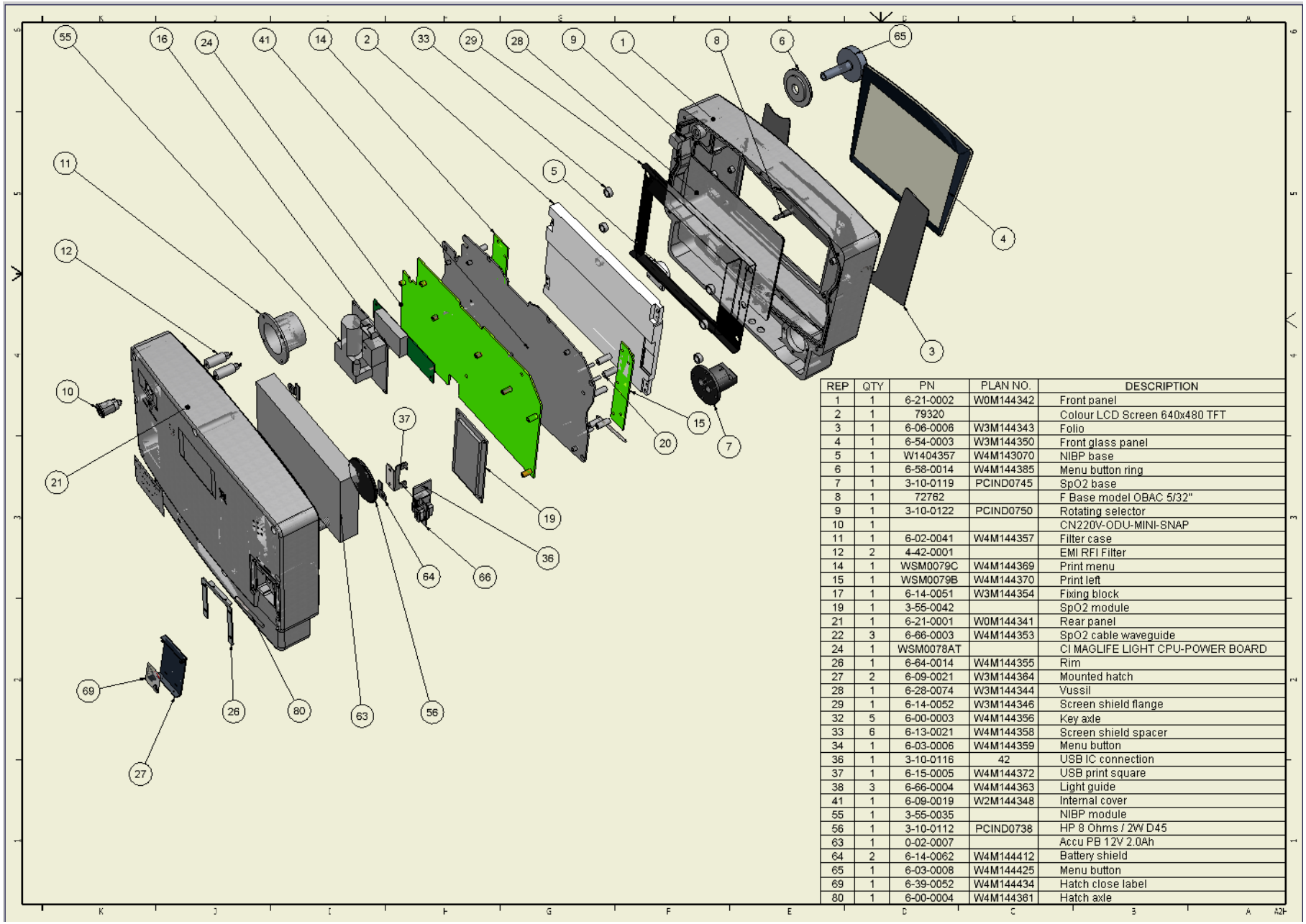
4.3 Replacement of parts

Warning :	**The replacement of parts must only be carried out by personnel who are specially trained and authorised by SCHILLER.** **Furthermore, all replacement parts must originate from SCHILLER.**

N.B. :	**To order a new part from SCHILLER, give the device type and serial number located on the rear of the device. Next, specify the article code for the part to be replaced.**

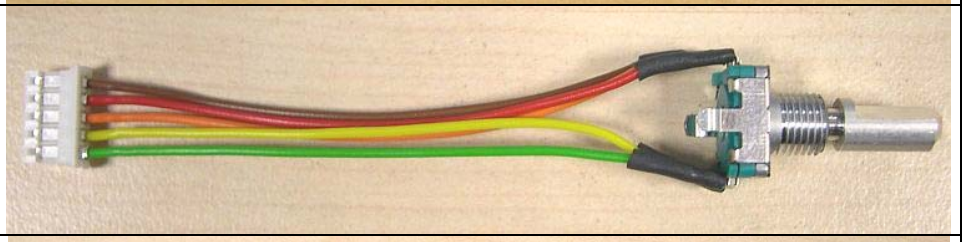
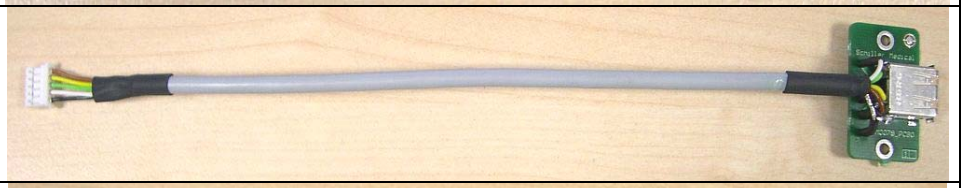
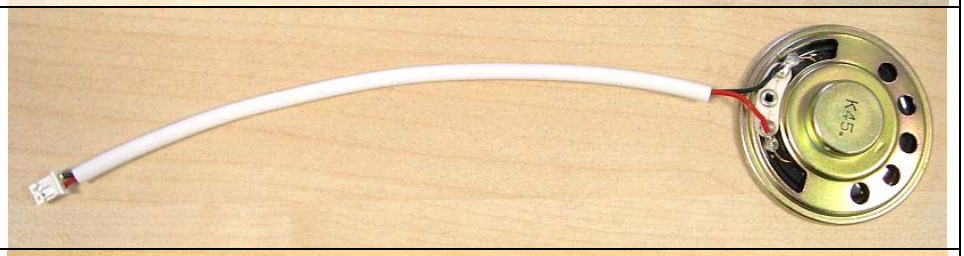
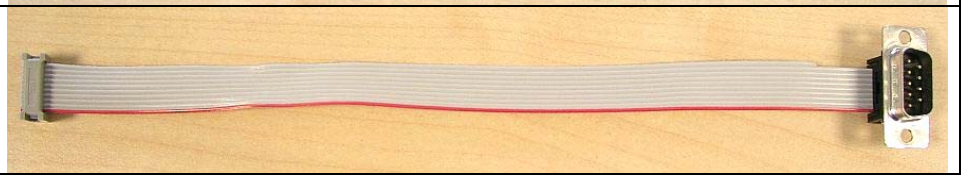


REP	QTY	PN	PLAN NO.	DESCRIPTION
1	1	6-21-0002	W0M144342	Front panel
2	1	79320		Colour LCD Screen 640x480 TFT
3	1	6-06-0006	W3M144343	Folio
4	1	6-54-0003	W3M144350	Front glass panel
5	1	W1404357	W4M143070	NIBP base
6	1	6-58-0014	W4M144385	Menu button ring
7	1	3-10-0119	PCIND0745	SpO2 base
8	1	72762		F Base model OBAC 5/32"
9	1	6-03-0007	PCIND0750	Rotating selector
10	1			CN220V-ODU-MINI-SNAP
11	1	6-02-0041	W4M144357	Filter case
12	2	4-42-0001		EMI RFI Filter
13	1	6-14-0056	W4M144373	Battery shield
14	1	WSM0079C		Print menu
15	1	WSM0079B		Print left
17	1	6-14-0051	W3M144354	Fixing block
19	1	3-55-0042		SpO2 module
21	1	6-21-0001	W0M144341	Rear panel
22	3	6-66-0003	W4M144353	SpO2 cable waveguide
24	1	WSM0078AT		CI MAGLIFE LIGHT CPU-POWER BOARD
26	1	6-64-0014	W4M144355	Rim
27	2	6-09-0021	W3M144364	Mounted hatch
28	1	6-28-0074	W3M144344	Vussil
29	1	6-14-0052	W3M144346	Screen shield flange
32	5	6-00-0003	W4M144356	Key axle
33	6	6-13-0021	W4M144358	Screen shield spacer
34	1	6-03-0006	W4M144359	Menu button
36	1	WSM0079D	PCIND0742	USB connection
37	1	6-15-0005	W4M144372	USB print square
41	1	6-09-0019	W2M144348	Internal cover
55	1	3-55-0035		NIBP module
56	1	3-10-0112	PCIND0738	HP 8 Ohms / 2W D45
63	1	0-02-0007		Accu PB 12V 2.0Ah
64	2	6-14-0062	W4M144412	Battery shield
65	1	6-03-0008	W4M144425	Menu button
66	1	3-10-0117	PCIND0743	RS232 Connection



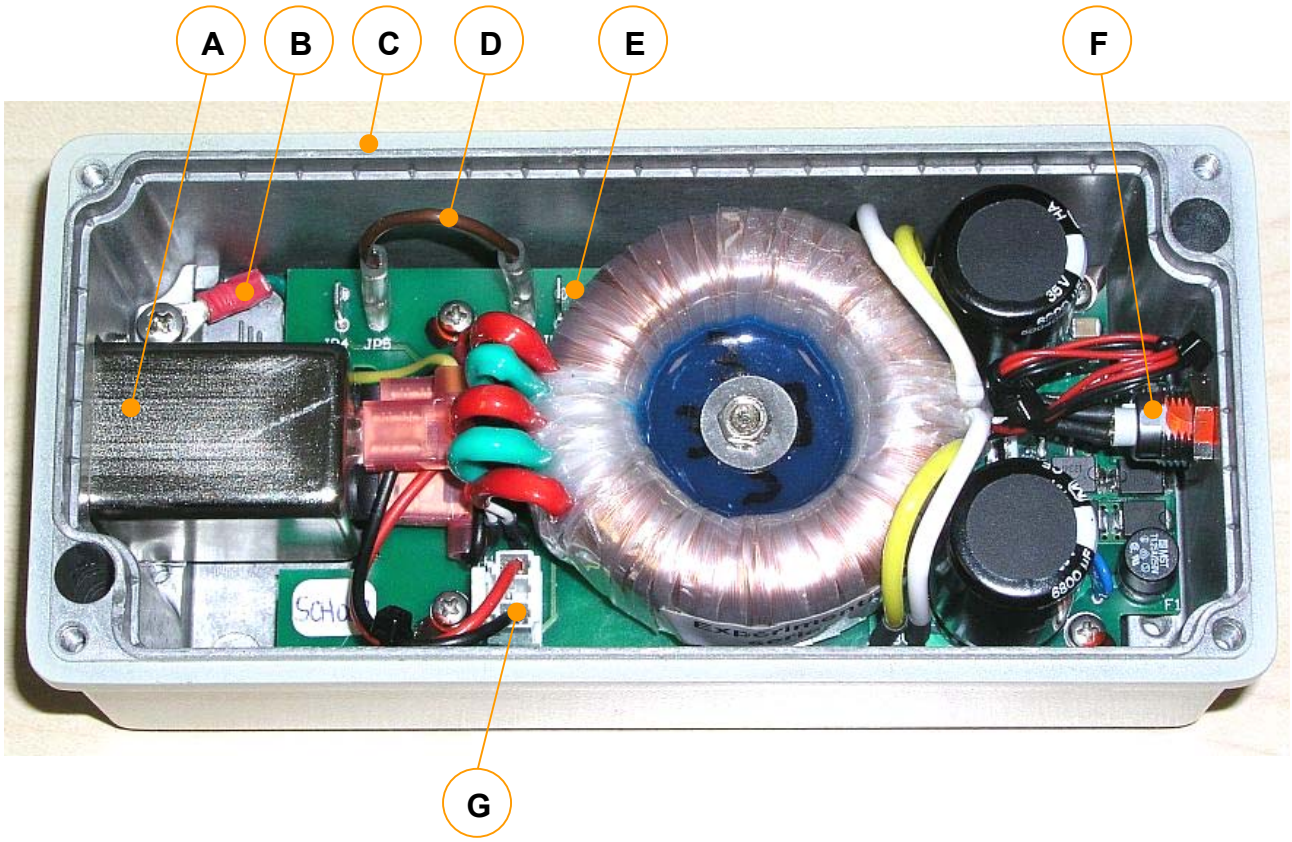
REP	QTY	PN	PLAN NO.	DESCRIPTION
1	1	6-21-0002	W0M144342	Front panel
2	1	79320		Colour LCD Screen 640x480 TFT
3	1	6-06-0006	W3M144343	Folio
4	1	6-54-0003	W3M144350	Front glass panel
5	1	W1404357	W4M143070	NIBP base
6	1	6-58-0014	W4M144385	Menu button ring
7	1	3-10-0119	PCIND0745	SpO2 base
8	1	72762		F Base model OBAC 5/32"
9	1	3-10-0122	PCIND0750	Rotating selector
10	1			CN220V-ODU-MINI-SNAP
11	1	6-02-0041	W4M144357	Filter case
12	2	4-42-0001		EMI RFI Filter
14	1	WSM0079C	W4M144369	Print menu
15	1	WSM0079B	W4M144370	Print left
17	1	6-14-0051	W3M144354	Fixing block
19	1	3-55-0042		SpO2 module
21	1	6-21-0001	W0M144341	Rear panel
22	3	6-66-0003	W4M144353	SpO2 cable waveguide
24	1	WSM0078AT		CI MAGLIFE LIGHT CPU-POWER BOARD
26	1	6-64-0014	W4M144355	Rim
27	2	6-09-0021	W3M144364	Mounted hatch
28	1	6-28-0074	W3M144344	Vussil
29	1	6-14-0052	W3M144346	Screen shield flange
32	5	6-00-0003	W4M144356	Key axle
33	6	6-13-0021	W4M144358	Screen shield spacer
34	1	6-03-0006	W4M144359	Menu button
36	1	3-10-0116	42	USB IC connection
37	1	6-15-0005	W4M144372	USB print square
38	3	6-66-0004	W4M144363	Light guide
41	1	6-09-0019	W2M144348	Internal cover
55	1	3-55-0035		NIBP module
56	1	3-10-0112	PCIND0738	HP 8 Ohms / 2W D45
63	1	0-02-0007		Accu PB 12V 2.0Ah
64	2	6-14-0062	W4M144412	Battery shield
65	1	6-03-0008	W4M144425	Menu button
69	1	6-39-0052	W4M144434	Hatch close label
80	1	6-00-0004	W4M144361	Hatch axle

Appearance of the subsets

REF.	PN	APPEARANCE OF THE PART
7	3-10-0119	
9	3-10-0122	
36	3-10-0116	
56	3-10-0112	
66	3-10-0117	

VDC power supply cable, PN 3-10-0118.

Mains power supply



REF	QTY	PN	PLAN No.	DESCRIPTION
A	1	4-21-0150		Mains connector
B	1	3-10-0121	PCIND0747	Earth cable
C	1	6-02-0042	W3M144376	Power supply case version 2
D	1 *	3-10-0124	PCIND0752	Cavalier cable transformer
E	1	WSM0081A		IC power supply
F	1	3-10-0113	PCIND0739	VDC output cable
G	1	3-10-0120	PCIND0746	Phase / neutral cable

(*) QTY 2 for 115 V mains wiring (see § 5.4.2).

5. Technical description

5.1 Operation of the MAGLIFE light device.

5.1.1 General information:

The MAGLIFE light device comprises the following elements:

The CPU POWER-board comprising a CPU section, a POWER section and all the connections required for access to the different elements of control, communication, signalling and visualisation. The board also supports and manages the SPO2 (OEM) and NIBP (OEM) options. The CPU provides the digital and analog processing of MAGLIFE light and the POWER section supplies the different power supplies required for the device to operate. All connections between the CPU section and the POWER section flow through chevrons. They enable the CPU section to be electrically isolated from the POWER section during testing of the latter. These connection lines are shunted through the POWER section, before the chevrons, on a test connector.

N.B. : In normal monitoring mode, all chevrons are closed.

Keyboard circuits which serve as an interface between user and device.

A screen on which the curves and different parameters can be displayed.

The MAGLIFE light power source can be provided by a mains power supply module through a connector located at the rear of the device and/or a battery permanently mounted in the device.
The battery is rechargeable through the power supply, and a light on the front panel indicates when this is taking place.

5.2 The CPU POWER BOARD circuit (WSM0078A)

5.2.1 The power supply section:

5.2.1.1 Presentation

The power supply section of MAGLIFE light delivers, from the mains power supply modules or from the lead 12 V–2Ah battery permanently mounted in the device, the following voltages:

U_MAINS
U_ALIM
+3.3V_TEST
+5V_TEST
+6V_TEST
EVER_VCC
U_BAT

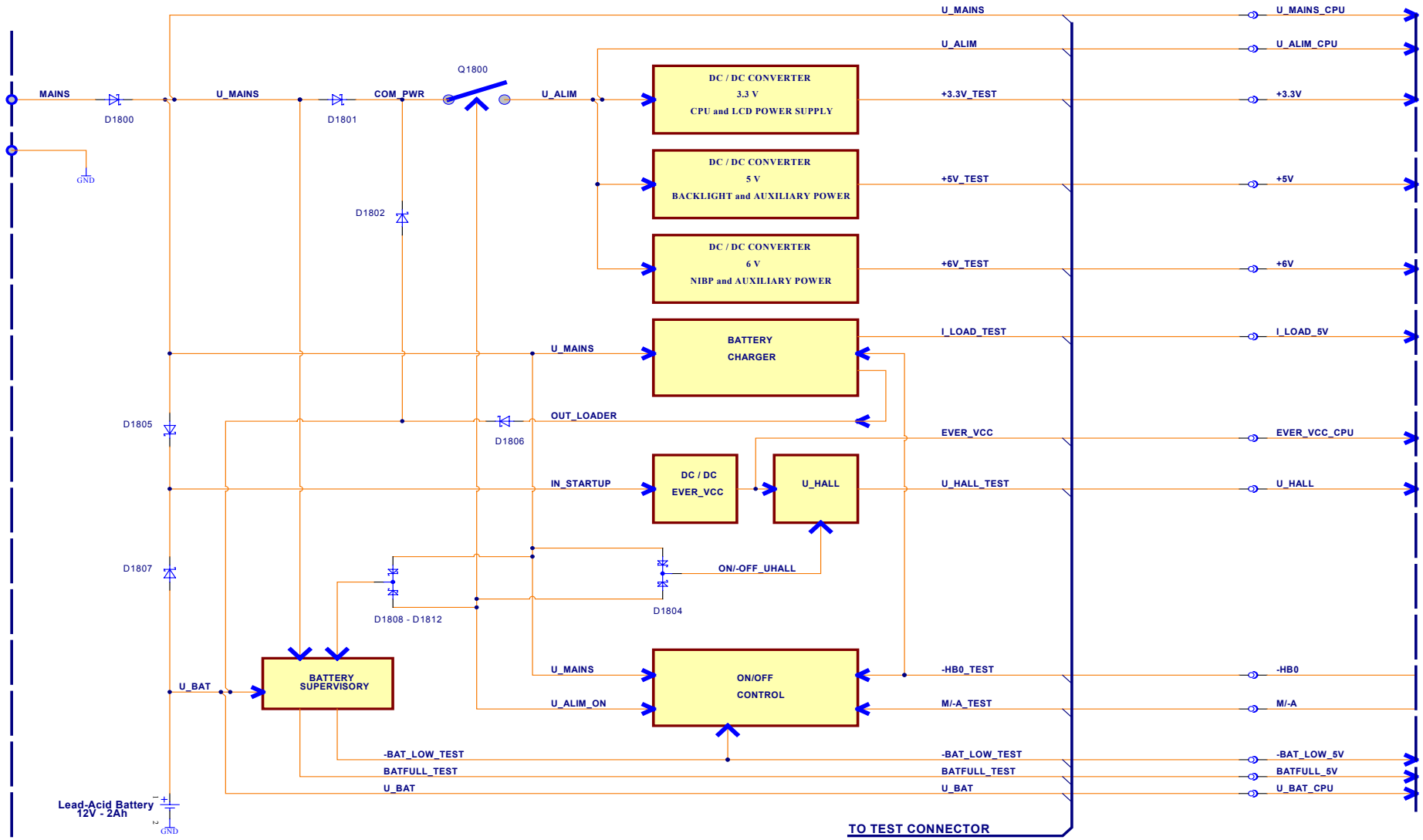
It also charges the battery, from the voltage delivered by the mains power supply module through the battery charger. Monitoring of battery charge status is provided by a system of comparators which deliver the signals BATFULL_TEST, I_LOAD_TEST and –BAT_LOW_TEST. The signals BATFULL_TEST and I_LOAD_TEST are used in combination to acknowledge the completion of battery charging. The signal –BAT_LOW_TEST also acts on the On/Off status of the power supply. It switches off the device hardware. This takes place when battery voltage is below 10 V. In parallel to the surveillance by the system of comparators, battery voltage is continuously monitored by means of the ADC of the CPU section.
Power supply On/Off control is under the control of the CPU section by means of the signals M/-A_TEST and -HB0_TEST. They control establishment of the U_ALIM, +3.3V_TEST, +5V_TEST, +6V_TEST and U_HALL_TEST voltages and activation of the battery charger.
The EVER_VCC voltage is always present. It only depends on the presence of one of the power sources; mains power supply module or battery.

The protection fuse of the MAINS power supply is located in the mains power supply module, while that of the battery is located on the CPU POWER-board.

5.2.1.2 Description of the input stage:

The power supply input of the device is protected against polarity reversal. This is carried out by means of D1800. The output of this diode delivers the U_MAINS voltage, from which the battery charger is supplied. It also supplies, via D1805, the DC/DC converter which produces the EVER_VCC power supply voltage. In addition, it is also used as a control signal acting at the level of U_HALL_TEST voltage command, and control of the power supply for the battery monitoring system (U1801 and U1803).
The common point formed by the D1801 and D1802 cathodes delivers the COM_PWR voltage which results from the U_MAINS and U_BAT voltage. The amplitude range of this voltage, according to the power sources in place (mains power supply module or battery), can vary between 32 V and 9.5 V. This is the voltage from which the U_ALIM switched power supply voltage is produced which supplies the +3.3 V, +5 V and +6 V DC/DC converters. It is also the voltage from which is produced the switched power supply voltage COM_PWR_CTRLD which supplies the battery monitoring system.
Similarly, the common point formed by the D1805 and D1807 cathodes delivers the IN_STARTUP voltage which is resultant from the U_MAINS and U_BAT voltages. This voltage supplies the DC/DC EVER_VCC converter.

Synoptic of the power supply section



5.2.1.3 Control of power supply voltages activation:

Switching of the U_ALIM voltage, from which are also produced the +3.3V_TEST, +5V_TEST and +6V_TEST voltages, is carried out by means of the Q1800 switching transistor. It is controlled by the U_ALIM_ON signal resulting from the logical operation carried out from the command signals M/-A_TEST, -HB0_TEST and status signal –BAT_LOW_TEST.

The signal –HB0_TEST, active low, cuts the power supply voltages when an excessive ambient magnetic field has been detected. Similarly, the signal –BAT_LOW_TEST active low cuts the power supply voltages when the battery voltage falls below 10 V.

The table below summarises the status of the switching transistor depending on the command and status signals.

Control of power supply voltages activation			
M/-A_TEST	**-HB0_TEST**	**-BAT_LOW_TEST**	**Q1800 Status**
0	0	0	Off
0	0	1	Off
0	1	0	Off
0	1	1	Off
1	0	0	Off
1	0	1	Off
1	1	0	Off
1	1	1	On

5.2.1.4 Power supply voltage +3.3V_TEST :

The power supply voltage +3.3V_TEST is produced from the U_ALIM voltage, by means of a DC/DC down converter built around U2000. It delivers a regulated voltage of +3.3 V +/- 5% and can provide a current of 1.5 A.

Activation of this voltage is controlled by the signal U_ALIM_ON.

5.2.1.5 Power supply voltage +5V_TEST :

The power supply voltage +5V_TEST is produced from the U_ALIM voltage, by means of a DC/DC down converter built around U2001. It delivers a regulated voltage of +5 V +/- 5% and can provide a current of 1.2 A.

Activation of this voltage is controlled by the signal U_ALIM_ON.

5.2.1.6 Power supply voltage +6V_TEST :

The power supply voltage +6V_TEST is produced from the U_ALIM voltage by means of a DC/DC down converter built around U2100. It delivers a regulated voltage of +6V +/- 5% and can provide a current of 1.2 A.

Activation of this voltage is controlled by the signal U_ALIM_ON.

5.2.1.7 Power supply voltage EVER_VCC :

The power supply voltage EVER_VCC is produced from the IN_STARTUP voltage, by means of a DC/DC down converter built around U1903. It delivers a regulated voltage of +6 V +/-10% and can provide a current of 300 mA.

The presence of this voltage is directly linked to the presence of the device's power supply sources (mains power supply module and/or battery). It is not switched. The EVER_VCC voltage mainly supplies the device's On/Off circuit and the ambient magnetic field measurement circuits.

5.2.1.8 Battery charger:

The battery charger comprises a DC/DC down converter built around U1900, a U1901 charge current measurement circuit and a U1902 end-of-charge detector. It is powered from U_MAINS, which is the voltage delivered by the mains power supply module. Its activation is controlled by the signal –HB0_TEST which commands shutdown of the charger when the device enters an excessive magnetic field. It delivers a voltage of 14 V and has a charge current limitation of 250 mA.

The charge current measurement is carried out across resistors equivalent to 0.5 Ω, R1907 and R1908, inserted into the charger's output line. The voltage developed on the terminals of the measurement resistor is applied to the U1901 amplifier circuit. This delivers a voltage, amplified by plus 50, which is proportional to the battery charge current. This is applied to the U1902B comparator, which has a transfer threshold set at 0.9, corresponding to a charge current of 18 mA. When this threshold is reached, the signal I_LOAD_TEST passes to low status. In combination with the signal BATFULL_TEST, the signal I_LOAD_TEST controls the battery charge indication light.

The table below gives the indication light status in accordance with the status of the signals I_LOAD_TEST and BATFULL_TEST.

I_LOAD_TEST	BATFULL_TEST	Status of battery charge indication light
0	0	
0	1	Lit
1	0	Flashing
1	1	Flashing

The outlet of the OUT_LOADER charger is equipped with protective elements, F1900 and D1806, intended to protect the battery against an excessive charge current and to prevent battery voltage return on the U1900 DC/DC converter outlet when the U_MAINS voltage is not present.
The F100 fuse placed at the outlet of the battery provides overall protection for the latter from the CPU POWER-board.

5.2.1.9 Battery voltage monitoring:

Battery voltage monitoring is carried out by a system of threshold comparators which delivers the BATFULL_TEST and –BAT_LOW_TEST status signals. The system of comparators is powered by a switched voltage COM_PWR_CTRLD. It is switched by the Q1806 transistor which is controlled by the U_ALIM_ON signal and/or the presence of the MAINS voltage. Similarly, the connection between the battery and the system of comparators is controlled by the Q1804 transistor. The aim of this management system is to control leakage currents drawn from the battery when the device is switched off and the mains power supply module unplugged.
The battery voltage is applied to the divider comprised of R1811 and R1814 which provide a reduction of 4.32. The resulting signal is then applied to the inlet of the U1803B and U1803A comparators by means of R1813 and R1819 resistors. These, in combination with R1809 and R1817, give hysteresis to the BATFULL_TEST and –BAT_LOW_TEST comparators.
The switching thresholds of the comparators are carried out from the VREF_PWR voltage delivered by U1801B and U1802. The voltage amplitude of the BATFULL_TEST and –BAT_LOW_TEST comparator outputs are limited to EVER_VCC voltage using clipping diodes D1810 and D1811.
The signals generated by the comparators are exploited by the CPU section of the board. However, the signal –BAT_LOW_TEST also acts at On/Off level by means of U1804. It causes switch-off of the device hardware when battery voltage falls below 10 V.

☞ **N.B. : Hardware switch-off is the final level of device shutdown. Under normal operation, device shutdown due to low battery is controlled by the CPU section. It is achieved by monitoring of battery voltage via the ADC. It takes place at 10.5 V.**
So as not to damage battery lifespan, never leave it in uncharged condition. In the event of device shutdown due to weak battery, the battery must be recharged as soon as possible.

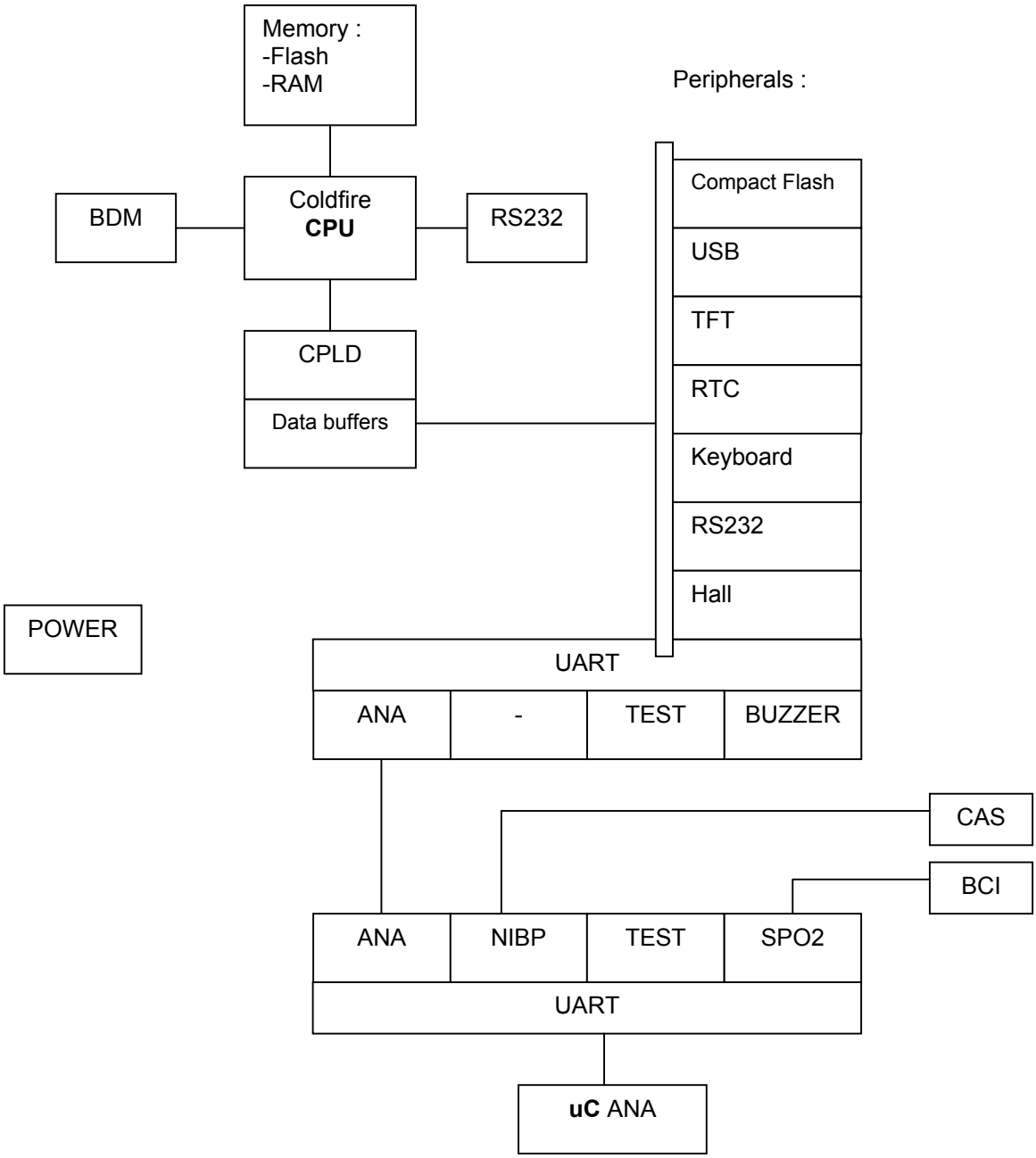
5.2.2 The CPU section

The CPU section contains the operating system (Linux), all associated specifications, keyboard management and display, management of signals coming from the sensors (SPO2, NIBP, Hall) and management of all inputs/outputs (peripherals).

It is comprised of a Coldfire microprocessor, memory (RAM and flash) and peripherals such as the USB, the TFT controller, the clock (RTC), the sound (Buzzer) and serial connections.
A programmable component (CPLD) is used for address decoding (selection of correct peripheral), generation of reset signals and certain control signals, and management of the keyboard and the rotating button. An analog micro-controller (ANA) enables management of the SPO2 and NIBP sensor signals and communication of the results to Coldfire.

The possible configurations are the use of an Oximeter and/or a sphygmomanometer.

5.2.2.1 Organigram



5.2.2.2 Top level

The CPU board holds the following connectors:
- TFT screen: JP100 connector enabling use of a 6"5 TFT screen
- Backlight : JP102
- Speaker : JP103
- Rotating button : JP104
- USB connector : JP112
- Serial connection RS232 : JP105
- SPO2 sensor : JP108 and JP109
- NIBP sensor : JP107
- Keyboard board : JP101
- Battery : P101
- External power supply : JP106

An on/off circuit sends an on/off signal to the POWER section in order to start up and shut down the device: When the ON/OFF button is pressed, the signal ON/OFF_BUT becomes active low and a 200 ms pulse is created by the monostable 4538 (U100A). This pulse sends a 5V on/off signal to the POWER section, which then supplies the different voltages. When the board is powered, after reset, it is the CPLD which creates a 5V –MONITOR_OFF_5V signal to take up the pulse. When the device is switched on, the on/off signal is still at 5V. To shut down the device, the–MONITOR_OFF_5V signal created by the CPLD passes to 0V. Two different cases can cause this switch to low status: A stoppage created by the software (confirmation of device shutdown by user or low battery measurement) or a safety shutdown generated by the ON/OFF button being pressed for at least 4 secs.

T filters (R-C-R) are present on all external signals.

A programmable logic creates a LOAD_ON signal from the I_LOAD_5V, BATFULL_5V and BATLOW signals, coming from the power section. This signal makes the LOADING led flash during a battery charge and makes it light up when the battery is charged.

5.2.2.3 Interconnections

The interconnected blocks on the CPU section are as follows:
- CPU
- Memory
- Data and address buffers
- Logical interface
- BDM connector
- TFT controller
- Compact Flash card
- Clock
- USB
- Sound section
- Hall effect sensors
- Serial interface
- Analog microcontroller
- NIBP power supply
- SPO2

These blocks are explained individually below.

5.2.2.4 CPU

The CPU is a Coldfire microprocessor made by Motorola, and it is responsible for executing the different programs (start-up, operating system and applications).

The main communication signals used by Coldfire are:

• general board reset	-RESET_CF
• address bus	CF_A[1..25]
• data bus	D[0..31]
• interrupts from CPLD	NT_H, INT_M, INT_L
• Transfer Acknowledge	-TA
• flash access chip select	CS0
• periphery access chip select	CS1
• bus clock	BCLK
• read/write (writing)	RW
• output enable (reading)	-OE
• serial connection 0 (console)	RXD_0, TXD_0, CTS_0, RTS_0, -INVALID_0
• serial connection 1	RXD_232, TXD_232, CTS_232, RTS_232, -INVALID_1
• BDM signals	PSTCLK, DSCLK, -BKPT, DSI, DSO, PST[0..3], DDATA[0..3]
• IDE signals (Compact Flash)	-RST_CF, -IORD, -IOWR, IORDY, BUFEN2
• RAM signals	-SDRAM_CS1, -SDRAS, -SDCAS, -SDWE, SDUDQM, SDLDQM, BCLKE

5.2.2.5 Memory

The flash AM29LV320 (U401) has a capacity of 4 Mb, and contains the bootloader (start-up program) and the operating system.
The SDRAM MT48LC16M16 (U400) has a capacity of 32 Mb, and contains the programs currently being executed (working memory).

5.2.2.6 Bus buffers

The CPU accesses the flash and the RAM directly, but data buffers are used during access to the different peripherals.
The address buffers 74LCX541 (U501, U502 and U503) are always on and mainly serve to drive enough current for the different peripherals.
The data buffer 74LCX16245 (U500) is activated with the signal –PERI created by the CPLD when peripherals are accessed.

5.2.2.7 CPLD

The CPLD manages address decoding and creates the Chip Select signals which activate each periphery individually. It also manages the keyboard and rotating button signals and various command and control signals.

The CPLD input and output signals are:

- address bus — B_A[1..23]
- data bus — B_D[24..31]
- bus clock — BCLK
- general reset — -RESET_CF
- chip select (peripherals) — -CS1
- transfer acknowledge — -TA
- peripheral elements chip select — -CS_CF1, -CS_CF2, -PERI, -CS_TFT, -CS_ADC, -CS_BUZZER, -CS_ANA, -CS_TEST, CS_RTC, -CS_USB
- element resets — -RST_USB, -RST_ADC, RST_BUZZER, -RST_TFT, RST_UART, -RST_MEM
- peripheral interrupts — INT_BUZZER, -INT_ADC, INT_USB, -INT_RTC, INT_ANA, INT_TEST, INT_CF
- interrupts going to coldfire — INT_H, INT_M, INT_L
- Read-Write and Output Enable (coldfire) — RW, -OE
- Read and Write (CPLD) — -RD_, -WR_
- Compact flash access — BUFENB2
- Communication with the TFT controller — TFT_RDY
- keyboard buttons — KEY_f[0..3]
- rotating button — PUSH_f
- on off button — ON/OFF_BUTf
- screen brightness adjustment — -BL_ON, BRT_UnD, -BRT_INC, -BRT_CS
- audio amp activation — SOUND_ON
- backlight activation — nMONITOR_OFF
- rotating button management — ROT_A_f, ROT_B_f
- UART clock (output) — CLK_UART_CF
- BUZZER clock (input) — CLK_BUZZER,
- interlocked NIBP pump — PUMP
- high magnetic field — -HB0
- battery low — nBAT_LOW
- battery full — BATFULL
- charge current present — I_LOAD
- mains present — MAINS
- low frequency clock — CLK_LOW
- Watchdog — WDI
- Coldfire reset out — nRSTO
-

5.2.2.8 BDM

The BDM (Background Debug Mode) connector enables the applications and hardware to be debugged and developed. It will also be used for the hardware tests.

5.2.2.9 TFT

The TFT controller used is the SED1386 (U800). It sends data to a 6"5 TFT screen.
A DS1804 (U803) digital potentiometer changes the backlight brightness. The signal BL_ON_5V is the command to supply power to the screen.

5.2.2.10 Compact Flash

Compact Flash is a memory containing the applications, configurations (options) and trends. It acts as the hard disk.

5.2.2.11 RTC

A battery-powered DS1501 (U1000) RTC (Real Time Clock) keeps the time on the device.

5.2.2.12 USB

The SL811 (U1100) USB controller enables implementation of a USB output to connect to a USB key or, potentially, to connect a printer.

5.2.2.13 Audio

Alarms are generated by an AT89C2051 (U1201) microcontroller.
A serial communication transmits a frequency and an amplitude to this microcontroller. The corresponding frequency is generated through a P1 serial port, and the sinusoid is smoothed out using resistors. The amplitude of the resulting signal is changed using a DS1804 (U1203) digital potentiometer. The U1202B operational amplifier generates a virtual mass. The signal is finally transmitted to a TDA1905 (U1200) audio amplifier which provides the necessary power.

5.2.2.14 Hall sensors

Magnetic field measurement is carried out from a very precise voltage. A P1300 potentiometer enables the output voltage of the LT1761 (U1300) regulator to be set at 5V +/-0.1%. Using a divider, two voltages, of 1.25 V and 3.75 V, are created and used as upper and lower thresholds for the magnetic field measurement. These thresholds correspond to a field of –40 mT and 40 mT. If these thresholds are crossed in one of the three field measurement directions, the signal –HB0 (active low) is generated, followed by abrupt device shutdown. A MAX1295 (U1304) analog digital converter measures the magnetic field in the three directions. It also measures battery voltage status, 6V and VCC voltage. For the field measurement, the ADC input voltage has simply been divided by 2 (reference of 2.5 V). For the battery voltage measurement, the ADC input voltage corresponds to the formula Vbat/k = Vbat/3 - 2.5.

5.2.2.15 UART

A UART TL16C754 (U1401) quad serves as a 3-serial-connection interface with the ANA microcontroller, the buzzer and a test connector.
74LVX3245 (U1400 and U1402) tension transceivers are used as an interface between the 3.3 V and 5V logical levels of certain signals.

5.2.2.16 Analog CPU

A AT89C51 (U1502) microcontroller manages communication between the SPO2 and NIBP sensors and the microprocessor. To do so, it is interfaced with a UART (U1500) quad, and uses a demultiplexer (U1503) to generate the Chip Select signals. A voltage supervisor (U1504) generates the start-up reset which initializes all the components.

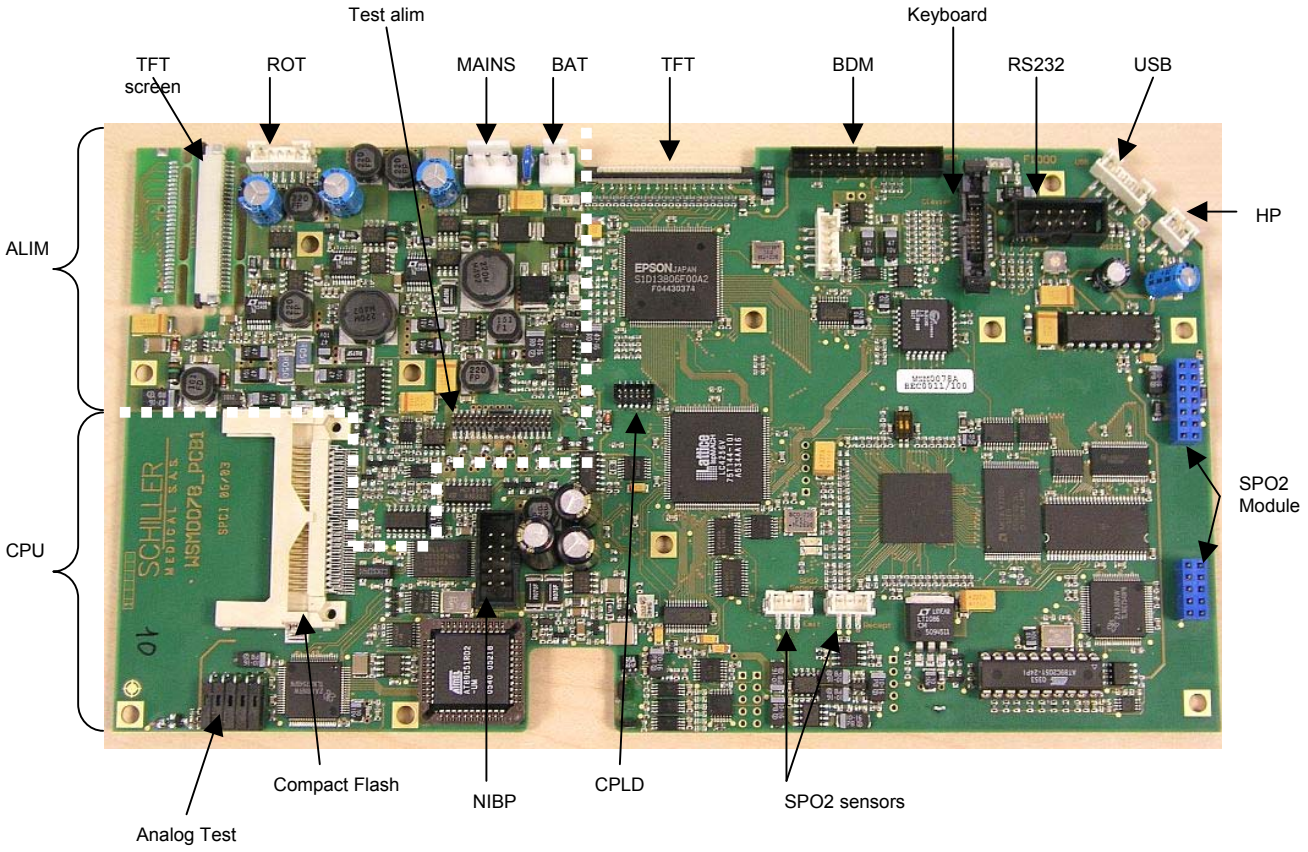
5.2.2.17 NIBP power supply

For the NIBP measurement, we use a CAS module.
Activation of the NIBP signal _ON_5V leads to generation of the +6V_CAS voltage.
The signal PUMP_5V is generated when the current consumed on the +6V_CAS voltage is high.

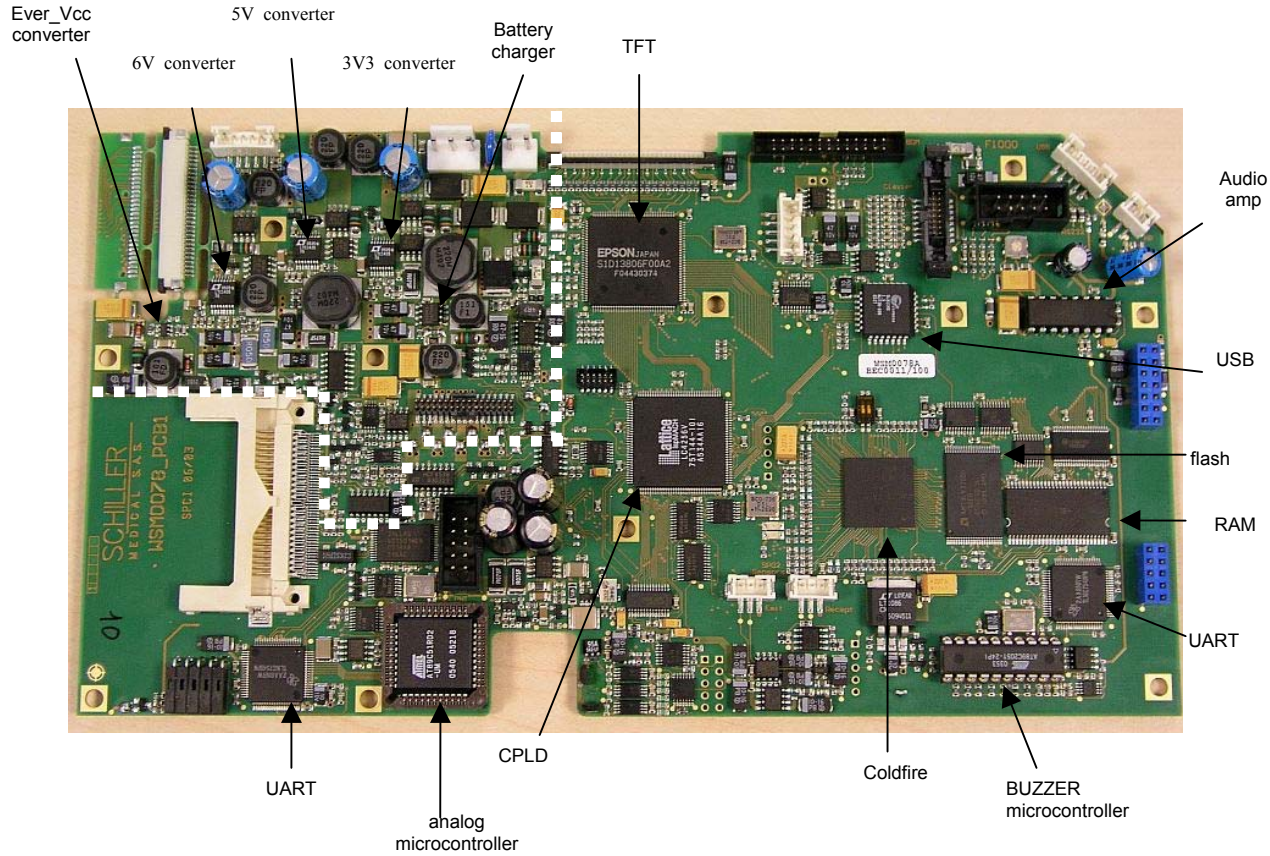
5.2.2.18 SPO2

For the SPO2 measurement, we use a BCI module.
The analog +5Va and –5Va voltages are realised using MAX1735 (U1702) and MAX883 (U1703) voltage regulators and a 7662 (U1701) voltage converter.
The U1700A and U1700B amplifiers amplify the input signals coming from the sensors.
The two connectors JP1700 and JP1701 are the connections to the BCI module.

5.2.2.19 The connectors:



5.2.2.20 The components:



5.3 The keyboard circuits and USB connection (WSM0079…)

The three circuits are part of the same flank. When these circuits are separated, a code article is attributed to each of them. These codes are as follows:

- IC CLAVIER G. MAGLIFE LIGHT (CA : WSM0079B). [Left keyboard circuit]
- IC CLAVIER D. MAGLIFE LIGHT (CA : WSM0079C). [Right keyboard circuit]
- IC CONNEXION USB MAGLIFE LIGHT (CA : WSM0079D). [USB connection]

5.3.1 The left keyboard circuit

This has three push buttons, the actions of which are transmitted to the CPU via a 16P flat cable connection. These three push buttons control the following functions :

- On/Off for a blood pressure measurement by cuff.
- Starting and stopping the audio alarms inhibition function (physiological and technical alarms).
- Partial On/Off of the device, known as “Standby”.

5.3.2 The right keyboard circuit

This has two push buttons which control the following functions:

- General On/Off of the device.
- Access to the main menu.

It also has the following three indication lights :

- Device operating light.
- Light indicating that the device is connected to the mains.
- Light indicating that the battery is charging.

All this information is sent via a 10P flat cable to the left keyboard and then to the CPU via the 16P flat cable.

5.3.3 The USB connection circuit.

This supports the USB connector and enables the USB plug to be attached to the rear of the device. This circuit also contains pins which enable easy soldering of the cable connecting the USB to the CPU.

5.4 The EXTERIOR ALIM (WSM0081A).

5.4.1 GENERAL INFORMATION:

The mains power supply module delivers, from the 50-60 Hz network, a rectified and filtered voltage (MAINS) which may vary, according to the current output, between 18 V and 32 V. It is designed to operate on 115 V and 230 V networks using a voltage selector integrated into the module board. The power conversion is performed using a 25 VA toroidal transformer with double windings, primary and secondary.

N.B. :	**For use on the 50/60 Hz - 100 V network, the EXTERIOR ALIM module is equipped with a specific 100 V transformer.**

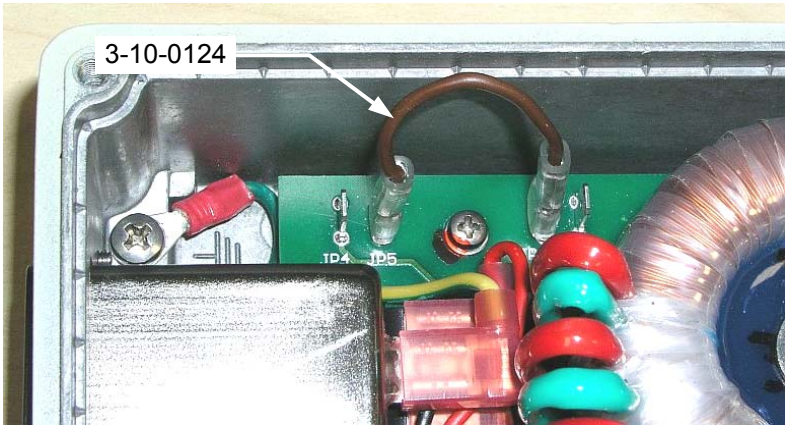
5.4.2 DESCRIPTION OF THE POWER SUPPLY:

The mains socket of the module incorporates EMI filters and fuse compartments. For operations on the 115 Vrms network, the value of the fuses is 200 mAT. For operations on the 230 Vrms network, the value of the fuses is 100 mAT.

The voltage selector is composed of four FASTON configuration cable terminals JP4, JP5, JP6, JP7. The module is configured for use on 230 V mains when cable terminals JP5, JP6 are connected together. It is configured for use on 115 V mains when cable terminals JP4, JP6 are connected together and cable terminals JP5, JP7 are connected together.

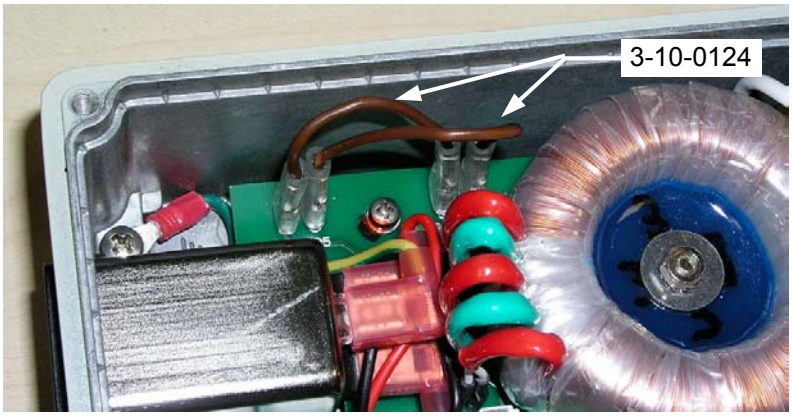
230 V version

Place 2 100 mAT fuses in the compartment provided in the mains base



115 V version

Place 2 200 mAT fuses in the compartment provided in the mains base



A thermo-fuse integrated into the transformer provides protection for it against excessive heating. It acts directly at the level of the primary by opening the power supply line.

The voltage delivered by the transformer secondary is double-alternation rectified by D1, D2, D3, D4 and filtered by C3, C4.

The R1, R3 resistors constitute a limitation of the input current of the C3, C4 capacitors when the module is switched on. As the filter capacitor terminals voltage increases, the Q2 transistor moves towards saturation and makes the Q1 transistor conductive. In this state, the MAINS output voltage is fully operational. Another

protection, constituted by the CTP R11, protects the limitation resistors R1, R3 against overheating in the event of short-circuiting of the filter capacitors.

In addition, the MAINS output voltage is equipped with a system for rapid discharge of filter capacitors C3, C4. Its aim is to prevent prolonged presence of MAINS voltage on the module output. While the module is under voltage, the signal taken from the D2 cathode blocks the Q3 transistor. In the absence of secondary voltage, the Q3 transistor is on and the filter capacitors are discharged through R7, R12.

6. Device modifications

6.1 Definition

ECL:

The ECL is the board modification index. There are two types of ECL numbering:
- the first has three figures (PNN).

  - P : corresponds to the board version number and is incremented on each rerouting.

  - NN : is incremented for each modification carried out on the board. NN falls back to 00 when the P version varies.

- the second has 2 letters (PN) of the board

  - P : corresponds to the board version number and is incremented on each rerouting.

  - N : is incremented for each modification carried out on the board. NN falls back to A when the P version varies.

6.2 The CPU POWER BOARD circuit (WSM0078A)

Article code	ECL	Modifications
WSM00078A	100	1st version of the board
WSM00078A	101	Modification 06.059.003, change of value from R1919 → 30.1 k.

6.3 The keyboard circuits and USB connection (WSM0079…)

Article code	ECL	Modifications
WSM0079B WSM0079C WSM0079D	100	1st version of the boards

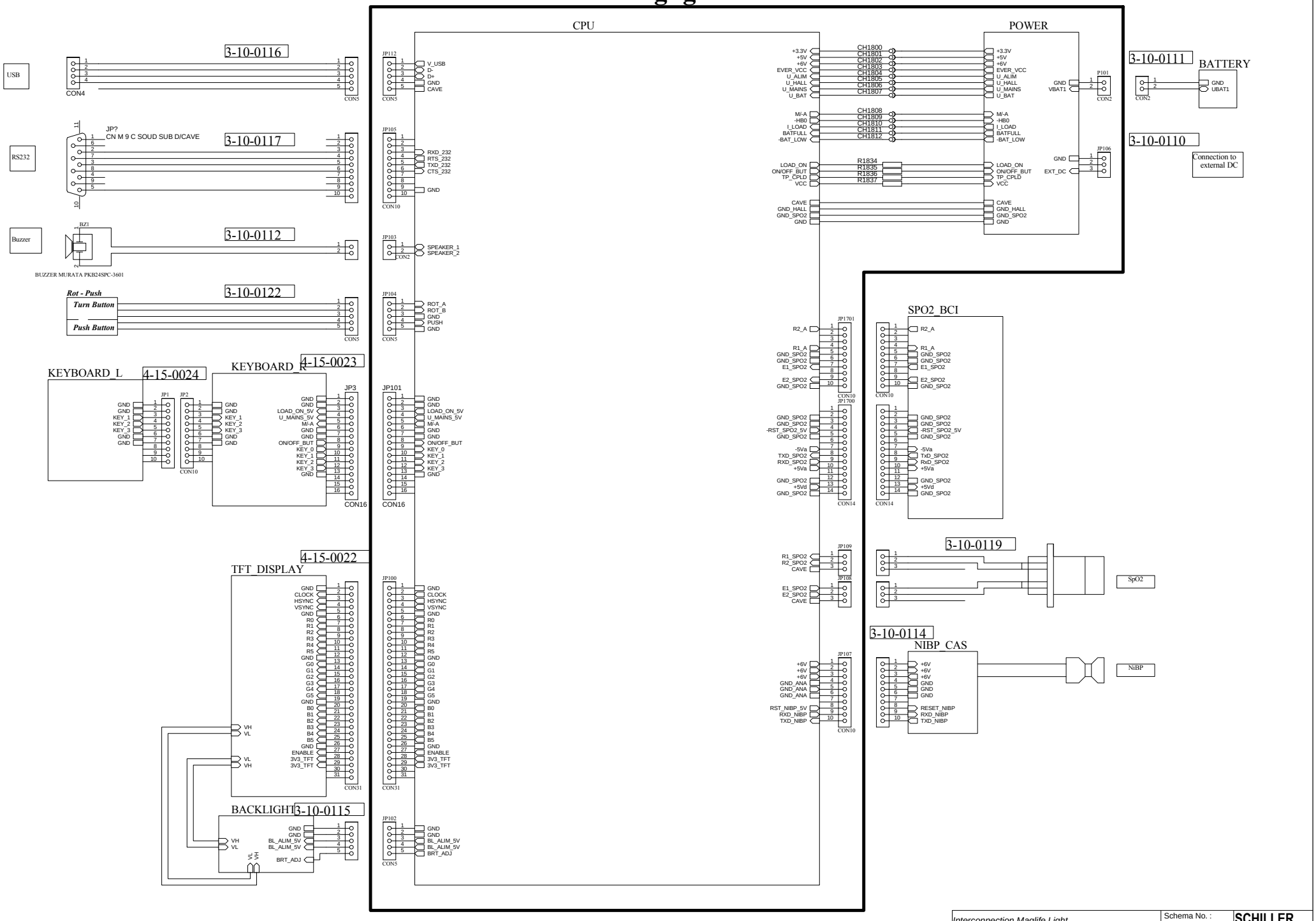
6.4 The EXTERIOR ALIM circuit (WSM0081A).

Article code	ECL	Modifications
WSM0081A	100	1st version of the board

7. Diagrams and layout drawings

7.1 General synoptic

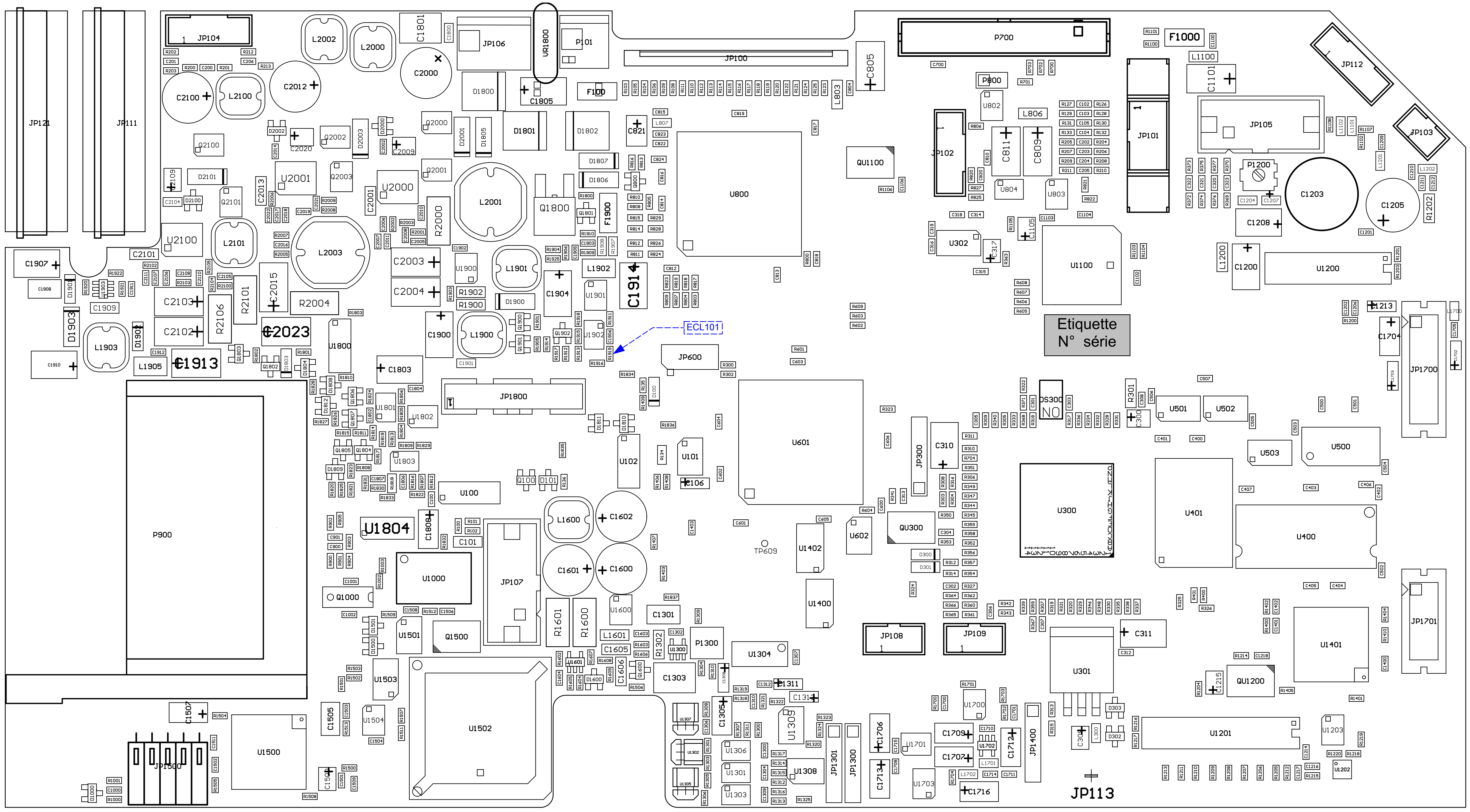
WSM0078 Maglight CPU-POWER BOARD



Interconnection Maglife Light		Schema No. : *V1.6*	**SCHILLER** MEDICAL S.A.S. 4, rue Louis Pasteur ZAE Sud BP50 67162 WISSEMBOURG CEDEX
Project : *103_Maglife Light*	PCB No.:	Date: *10/01/2005*	
Size: *A2* Drawn by : *SIS/JME*	Art. No. :	Sheet *1* of *1*	

7.2 The CPU POWER BOARD circuit (WSM0078A)

WSM0078_PCB1



D1803, JP120, JP121, JP1300, JP1400, JP300, JP1301, P800, L1905, Q800, R1102, R136, R1307, R1403, R1704, R1905, R303, R304, R342, R401, R803, R805, R807, R808, R809, R810, R811, R813, R815, R816, R818, R826, R828, R1002, R1100, R1103, R309, R310, R311, R344, R345

ne sont pas monté / are not mounted

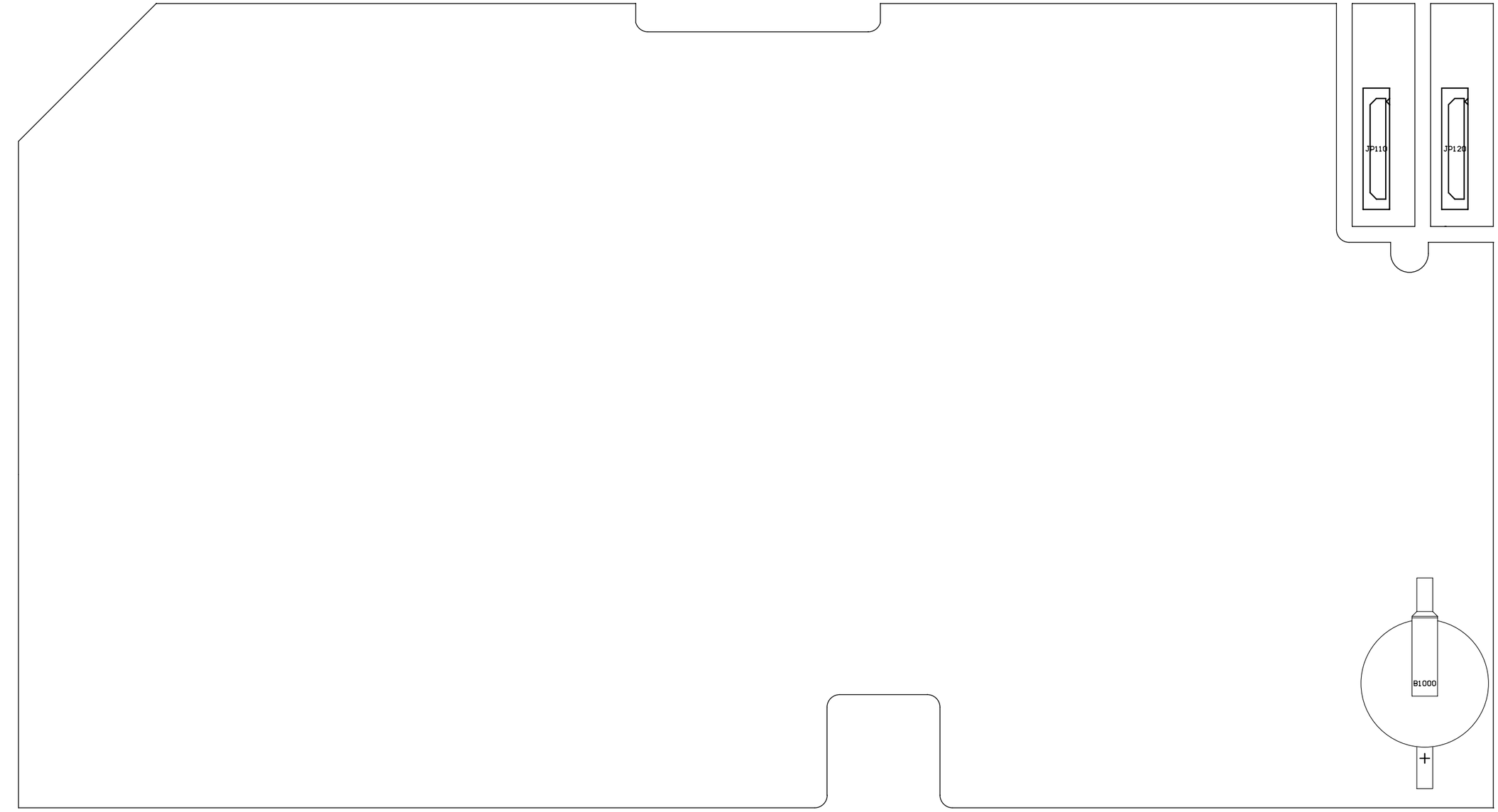
Dimensions : 235 X 128 mm

MAGLIFE LIGHT
Circuit CPU
CPU board

DRAWN	APPROV	MODIFICATION
NF	CK	CK
ECL100 01 / 06	ECL100 01 / 06	ECL101 06 / 06

ART : WSM0078A
PRT : WSM0078_PCB1
DGW : WSM0078AREF101
SHT : 1/2

SCHILLER MEDICAL S.A.S



DEFIGARD MAGLIFE LIGHT
Circuit CPU
CPU board

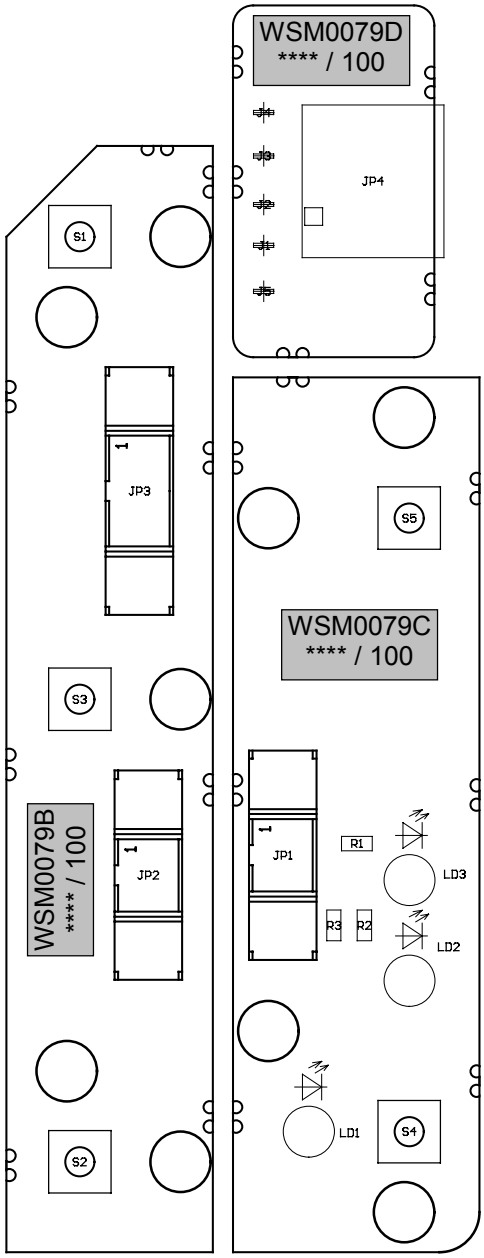
DRAWN	APPROV	MODIFICATION			
NF	CK	CK			
ECL100 01 / 06	ECL100 01 / 06	ECL101 06 / 06			

ART : WSM0078A
PRT : WSM0078_PCB1
DGW: WSM0078AREF101
SHT : 2/2

SCHILLER MEDICAL S.A.S

7.3 The keyboard circuits and USB connection (WSM0079…)

WSM0079_PCB1



Dimensions: 124 mm x 62,5 mm

MAGLIFE LIGHT
Circuit clavier
Keyboard

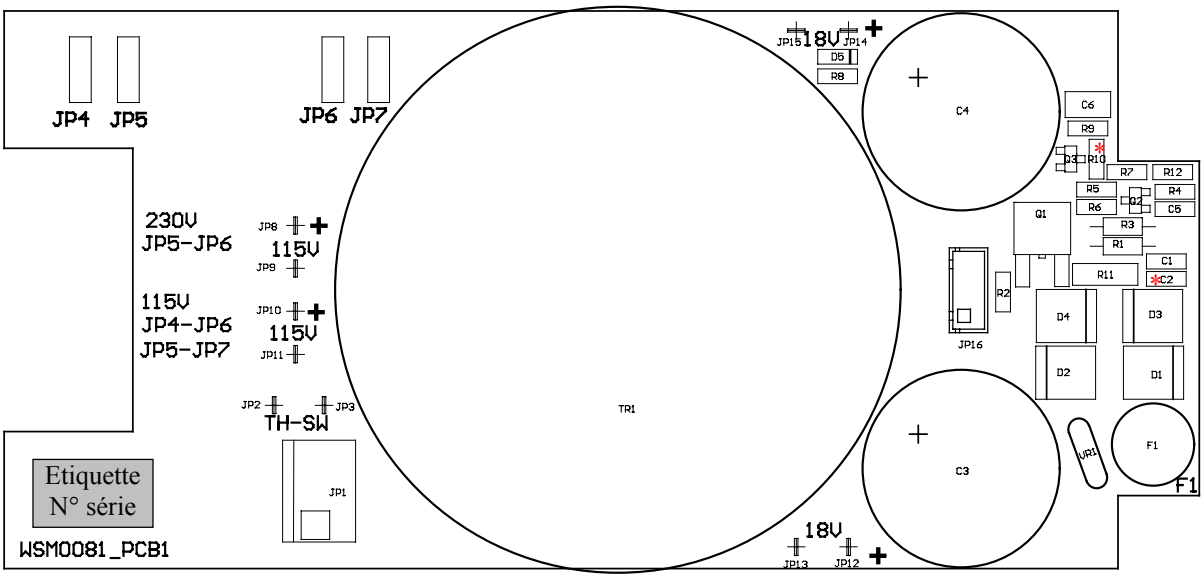
DRAWN	APPROV	MODIFICATION			
CK	CK	CK			
ECL000 09 / 05	ECL000 09 / 05	ECL100 01 / 06			

ART : WSM0079A
PRT : WSM0079_PCB1
DGW : WSM0079AREF100
SHT : 1/1

SCHILLER MEDICAL S.A.S.

7.4 The EXTERIOR ALIM circuit (WSM0081A).

WSM0081_PCB1



* = pas monté / not mounted

Dimensions: 130 mm x 65 mm

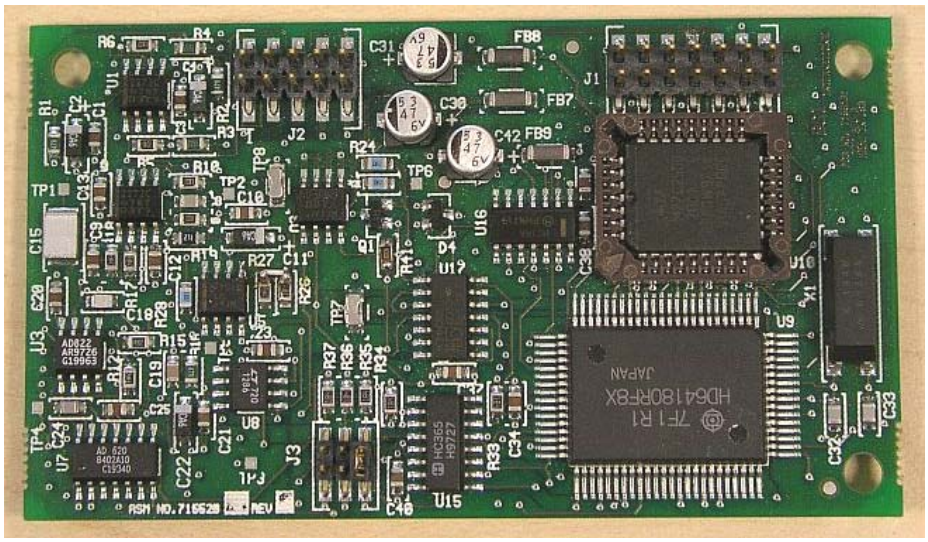
MAGLIFE LIGHT
Circuit alimention
Power board

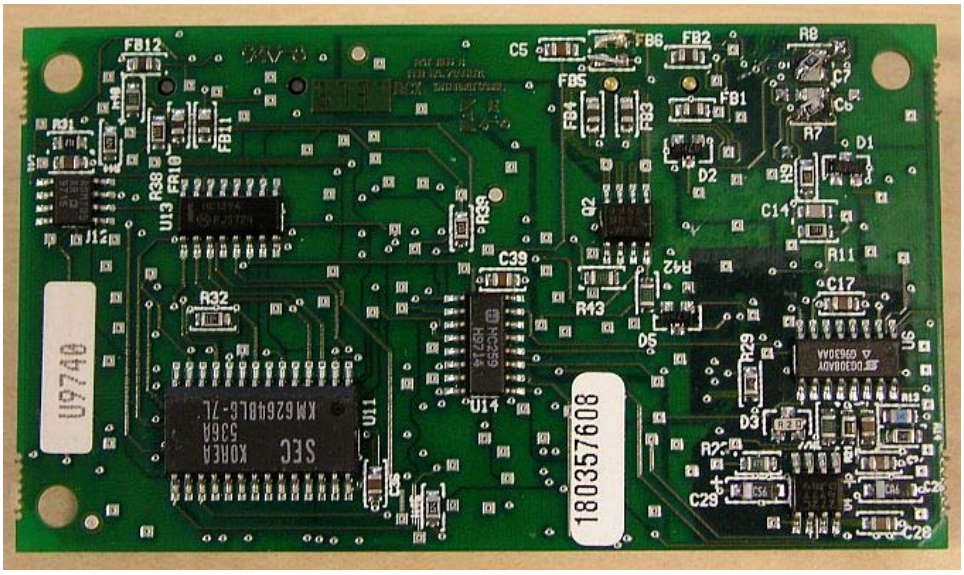
DRAWN	APPROV	MODIFICATION			
NF	CK				
ECL100 02 / 06	ECL100 02 / 06				

ART : WSM0081A
PRT : WSM0081_PCB1
DGW : WSM0081AREF100
SHT : 1/1

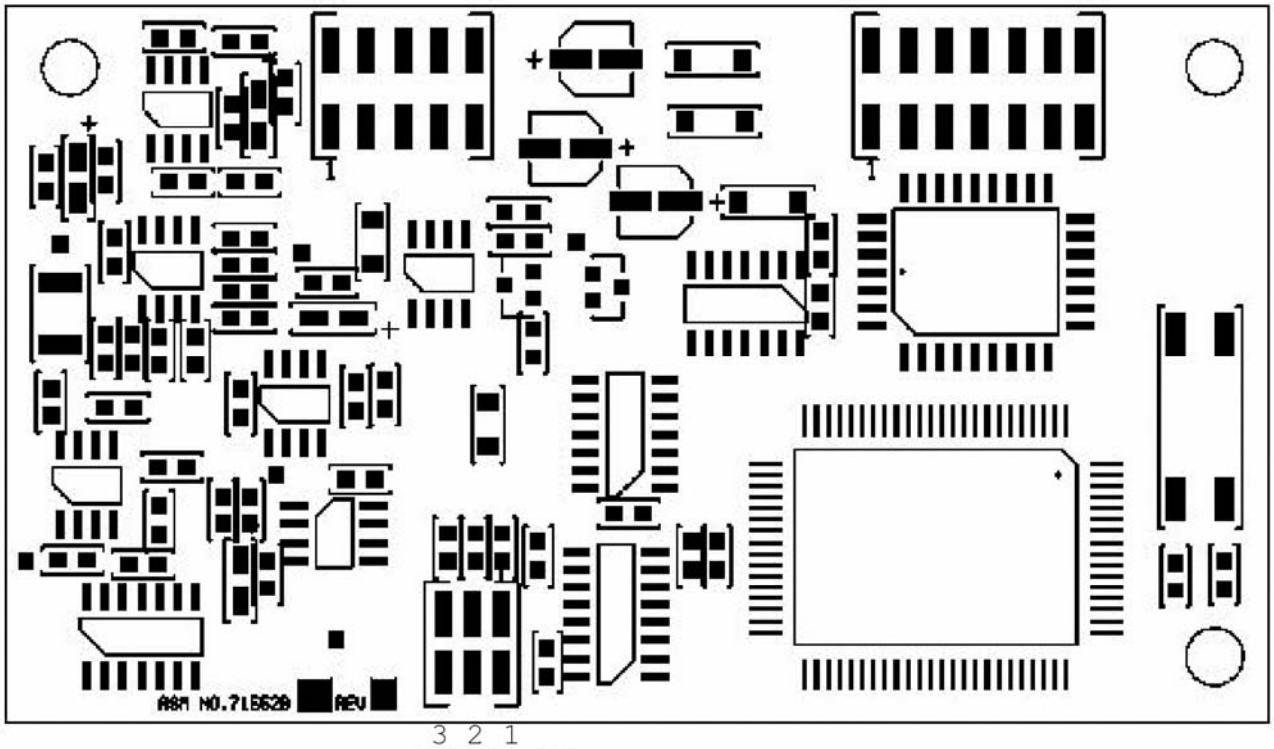
SCHILLER MEDICAL S.A.S.

7.5 The OEM CPU SPO2 module (3-55-0042)





J2 J1

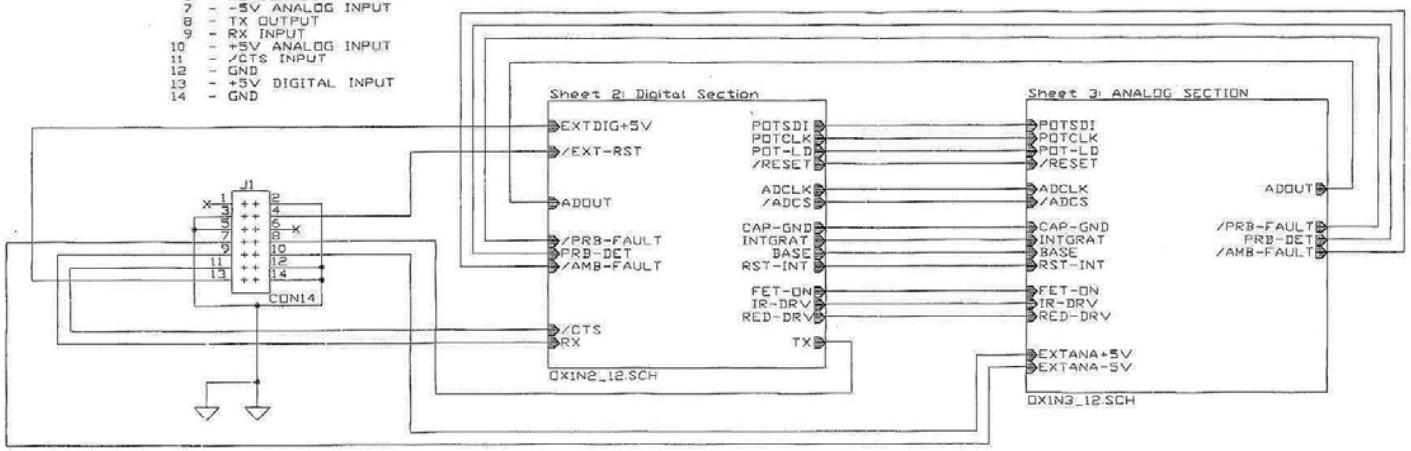


3 2 1
JUMPER J3

DRWG NO: 71552S1	
REV.	DESCRIPTION
0	PRODUCTION RELEASE. C/N 4136 MER 8-13-97
1	SEE SHEET 3 C/N 6174 RPA 07-18-00
2	SEE SHEET 3 C/N 6227 JBK 8-17-00

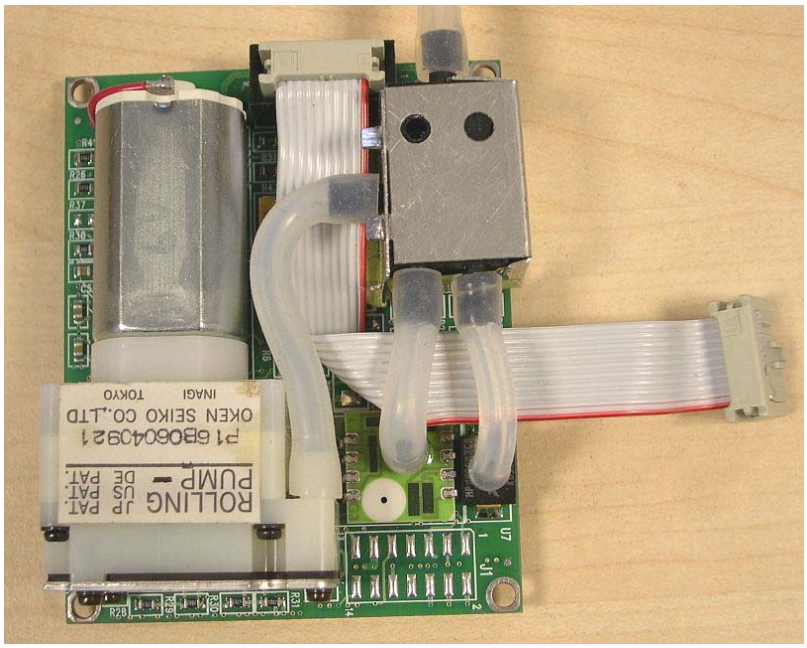
CONNECTOR J1
POWER AND COMMUNICATION

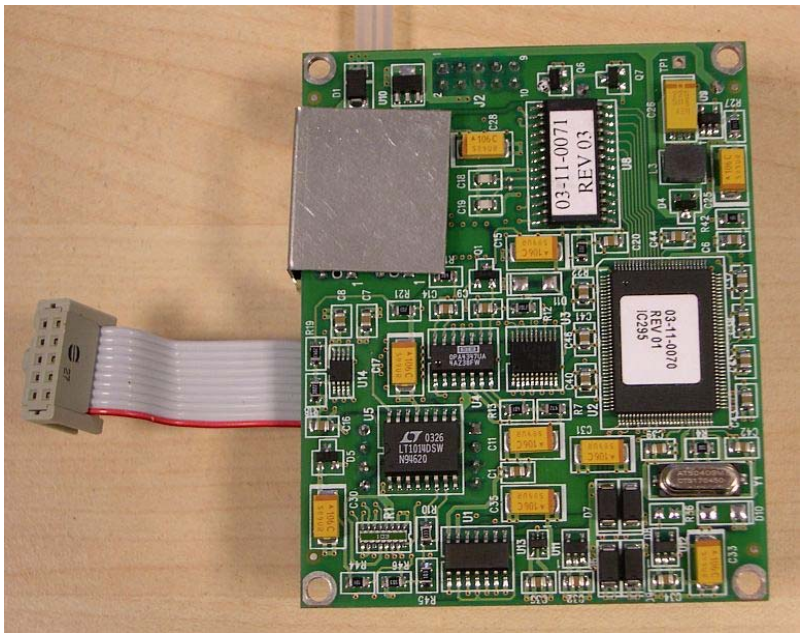
1 - NO CONNECT
2 - GND
3 - GND
4 - /RESET INPUT
5 - GND
6 - NO CONNECT
7 - -5V ANALOG INPUT
8 - TX OUTPUT
9 - RX INPUT
10 - +5V ANALOG INPUT
11 - /CTS INPUT
12 - GND
13 - +5V DIGITAL INPUT
14 - GND



BCI INTERNATIONAL		
DRAWN BY: MER	CHK. BY: P. ROPELLA	ENG. APPR.: GEISLER
DATE: 8-11-97	DATE: 8-14-97	DATE: 8-14-97
SCALE: NTS	DO NOT SCALE PRINT	Q.A. APPR.: DAS
THIS DOCUMENT CONTAINS CONFIDENTIAL AND/OR PROPRIETARY INFORMATION AND IS NOT TO BE RE-PRODUCED, DISTRIBUTED OR DISCLOSED WITHOUT PRIOR APPROVAL OF BCI INTERNATIONAL OR ITS DESIGNATED AGENT.		DATE: 8-14-97
		MFG. APPR.: M.S.
		DATE: 8-14-97
MATERIAL:		TOLERANCE UNLESS OTHERWISE SPECIFIED: XX: ± .020 XXX: ± .005 ANGLES: ± 1°
FINISH:		
TITLE: SCHEMATIC, BC SP02 MAIN BOARD		DRWG NO: 71552S1 REV.: 2
		SHT. 1 OF 3

7.6 The 6V NIBP module (3-55-0035).





EPAIR PARTS:

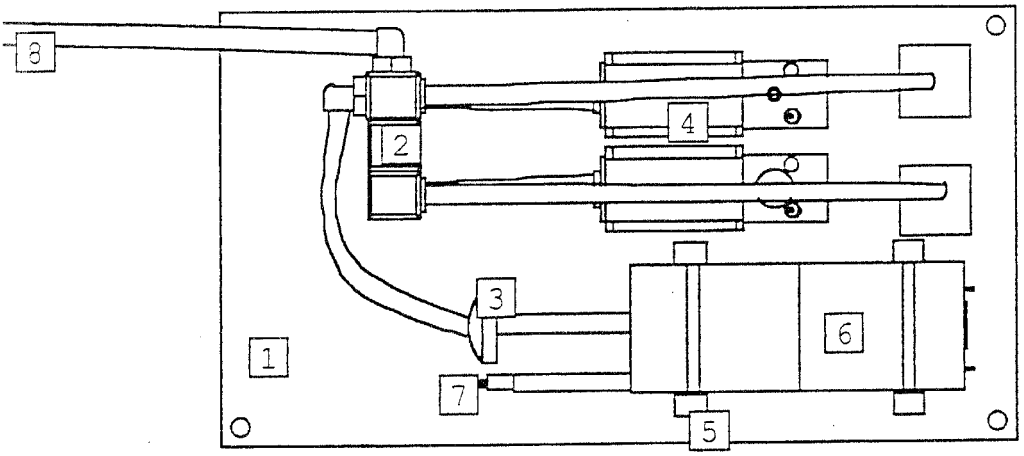


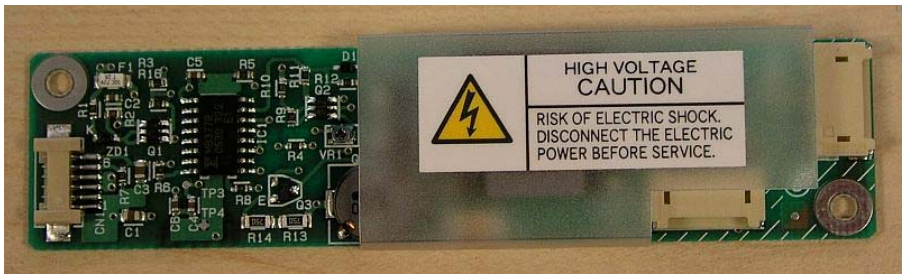
Figure 11 Pneumatic Layout

ITEM NUMBER	PART NUMBER	DESCRIPTION
1	03-09-0043	Circuit board
2	03-08-0139	Manifold
3	27-03-0056	Check valve
4	27-03-0048	12 Volt Valve
4	27-03-0032	6 Volt Valve
5	25-01-0032	4" clamp tie
6	27-01-0007	12 Volt Pump
6	27-01-0006	6 Volt Pump
7	27-03-0024	Filter
8	28-01-0002	Tubing

dition to the parts specified in the table above, the module ains several other parts which the circuit board requires in to function. In the event these are needed, contact CAS ory service for assistance.

4-0010	Voltage Regulator U6
3-0042	Barb cap
3-0001	Pressure transducers (2)
1-0002	Mosfet Transistors (2)
1-0007	Diode 1N5818
1-0018	EPROM 27C512
6-00XX	NB module software, various versions

7.7 The DC/DC CCFL +5V converter (3-55-0042).



1. DESCRIPTION

This 65PWB31 inverter is only for adaptable LCD modules. Adaptable LCD modules are as follows.

Adaptable LCD module
NL6448AC20-06
NL6448BC20-08
NL6448BC20-08E
NL6448BC26-01
NL6448BC26-03
NL10276BC12-02

2. SPECIFICATION

2.1 GENERAL SPECIFICATIONS

Item	Specification	Unit
Size	See **4.Outline drawings.**	mm
Weight	20 (Max.)	g
Delivery unit	10 (Min.)	set

2.2 ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Rating	Unit	Remarks
Power supply voltage	VDDB	6.0	V	Ta = 25°C
Storage temperature	Tst	-30 to +70	°C	-
Operating temperature	Top	-10 to +60	°C	
Relative humidity Note1	RH	≤ 95	%	Ta ≤ 40°C
		≤ 85	%	40 < Ta ≤ 50°C
Absolute humidity Note1	-	≤ 78 Note2	g/m^3	Ta > 50°C

Note1: No condensation

Note2: Ta = 50°C, RH = 85%

2.3 ELECTRICAL CHARACTERISTICS

(Ta = 25°C)

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remarks
Input voltage	Power supply voltage	VDDB	4.75	5.0	5.25	V	-
Input current	Power supply current	IDDB	-	900	1000	mA	VDDB = 5.0V Note1
Output voltage	Open lamp voltage	VO	900	-	-	Vrms	Starting voltage for lamp
Output current	LCD lamp	IL	-	5.0	-	mArms	per one lamp
Oscillation frequency		FO	51.0	55.0	59.0	kHz	-
Luminance control frequency for LCD lamp		FL	250	270	290	Hz	

Note1: The power supply lines (VDDB and GNDB) occurs large ripple voltage while luminance control of LCD lamps. There is the possibility that the ripple voltage produces acoustic noise and signal wave noise in audio circuit and so on. Put a capacitor (5,000 to 6,000μF) between the power source lines (VDDB and GNDB) to reduce the noise, if the noise occurred in the circuit.

2.4 FUSE

Parameter	Fuse		Rating	Fusing current	Remarks
	Type	Supplier			
VDDB	KE20	Daito Communication Apparatus Co., Ltd.	2.0A 24V	4.0A	Note1

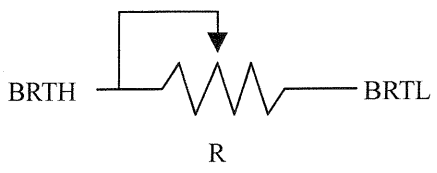
Note1: The power supply capacity should be more than the fusing current. If the power capacity is less than the fusing current, the fuse may not blow for a short time, and then nasty smell, smoking and so on may occur.

2.5 CONNECTIONS AND FUNCTIONS FOR INTERFACE PINS

CN1 socket (Inverter side): IL-Z-6PL-SMTY (Japan Aviation Electronics Industry Limited (JAE))
Adaptable plug: IL-Z-6S-S125C3 (Japan Aviation Electronics Industry Limited (JAE))

Pin No.	Symbol	Function	Remarks
1	GNDB	Backlight ground	-
2	GNDB	Backlight ground	-
3	VDDB	Power supply	-
4	VDDB	Power supply	-
5	BRTL	Luminance control input	Note1
6	BRTH	Luminance control input	Note1, Note2

Note1: A way of luminance control by a variable resistor.



Mating variable resistor: 10 kΩ±5 %
Minimum luminance (30%) : R = 0 Ω
Maximum luminance (100%): R = 10 kΩ

Note2: A way of luminance control by a voltage.
The range of input voltage between BRTH and GNDB is as follows.

NL6448AC20-06
Minimum luminance (30%): 1.5V
Maximum luminance (100%): 1.9V

Other than NL6448AC20-06
Minimum luminance (30%): 1.5V
Maximum luminance (100%): 2.3V

If BRTH voltage is higher than 2.5V, the internal circuit will be damaged.

CN2 and CN3 socket (Inverter side): SM02 (8.0)B-BHS-TB (J.S.T TRADING COMPANY, LTD.)
Adaptable plug: BHR-03VS-1(J.S.T TRADING COMPANY, LTD.)

Pin No.	Symbol	Function	Remarks
1	V_{HIGH}	High voltage terminal	-
2	N.C.	Non-connection	-
3	V_{LOW}	Low voltage terminal	-

Note1: V_{HIGH} and V_{LOW} must be connected correctly. If customer connects wrongly, customer will be hurt and the product will be broken.

OUTLINE DRAWINGS (reference)

(Unit: mm)